

NUCLEAR DATA AND MEASUREMENTS SERIES

ANL/NDM-1

Cobalt Fast Neutron Cross Sections – Measurement and Evaluation

by

P.T. Guenther, P.A. Moldauer, A.B. Smith, D.L. Smith, and J.F. Whalen

July 1973

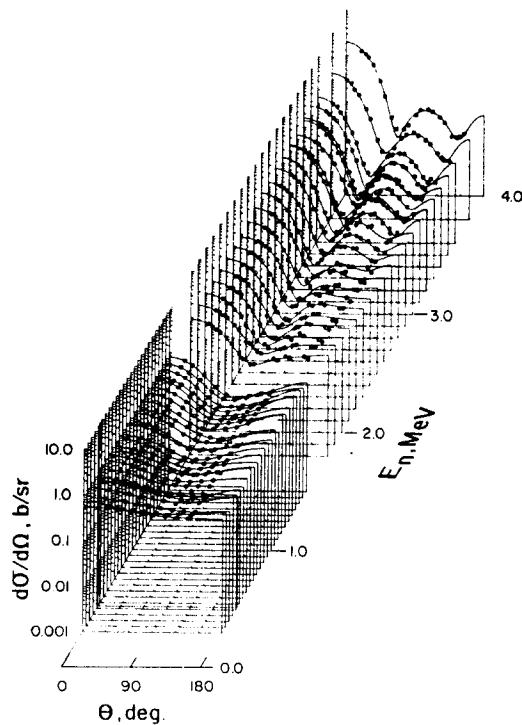
**ARGONNE NATIONAL LABORATORY,
ARGONNE, ILLINOIS 60439, U.S.A.**

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NUCLEAR DATA AND MEASUREMENTS SERIES

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PREFACE

This document presents results of recent experimental studies, develops a physical interpretation and makes use of these measured and calculated results, together with previously reported information, to deduce an evaluated data file in the ENDF format. The endeavor makes contemporary nuclear data promptly available in a format suitable for a wide range of applied neutronic calculations.

Argonne National Laboratory
September, 1973

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COBALT FAST NEUTRON CROSS SECTIONS - MEASUREMENT AND EVALUATION*

by

P. T. Guenther, P. A. Moldauer, A. B. Smith, D. L. Smith and J. F. Whalen

ABSTRACT

Elastic and inelastic scattering cross sections of cobalt are measured from incident energies of 1.8 to 4.0 MeV including those for the excitation of states at 1.10 ± 0.01 , 1.20 ± 0.01 , 1.30 ± 0.01 , 1.43 ± 0.01 , 1.46 ± 0.02 , 1.72 ± 0.02 , 2.06 ± 0.02 , 2.09 ± 0.02 , 2.16 ± 0.03 , 2.35 ± 0.05 and 2.50 ± 0.05 MeV. Total neutron cross sections are measured from ~ 2.0 to 4.5 MeV. From the experimental results, and previously reported values, an optical-statistical model is deduced providing a quantitative description of measured values to 20.0 MeV. The observed excited structures and cross sections are shown consistent with a nuclear structure model based upon a proton hole in the $f_{7/2}$ shell strongly coupled to a spherical core and a solution of previous ambiguities in J^π assignments is suggested. The available experimental information and the computational model are utilized to provide a comprehensive evaluated data file in the ENDF format suitable for use in fission reactor, fusion reactor and other applied neutronic calculations. This evaluated file is explicitly presented in the Appendix.

*This work supported by the U. S. Atomic Energy Commission.

I. INTRODUCTION

Cobalt is a constituent of many ferrous-based alloys finding wide use as structural materials in neutronic systems. In addition neutron induced processes in cobalt are the physical basis for a number of spectral-index and dosimetry methods. Basic nuclear properties of cobalt have been extensively studied using a number of nuclear reactions (1). More than forty states have been reported to excitations of ≈ 3.5 MeV. Despite these efforts, the spins and parities of some low-lying excited states remain ambiguous. Cobalt, with 27 protons, is one proton short of a closed $f_{7/2}$ shell and its structure should reasonably be related to nuclear shell concepts. Thus fast neutron induced processes in cobalt are of interest from both the applied and basic points of view.

The major knowledge of elastic neutron scattering from cobalt at energies of ≤ 1.5 MeV results from the work of Smith et al. (2). Holmqvist and Wiedling (3) have reported elastic scattering measurements between ≈ 1.5 and ≈ 8.0 MeV at intervals of about 500 keV and Kinney and Perey (4) have reported results in the range ≈ 5.0 to 8.0 MeV. Several other elastic scattering measurements have been reported in the interval 3.0 to 4.0 MeV (5,6,7) and, apparently, a single measurement at ≈ 14.0 MeV (8). The total neutron cross section is known to fluctuate to energies of ≈ 4.0 MeV and the elastic scattering can be perturbed by such effects. There have apparently been only two sets of direct measurements of inelastic neutron scattering from cobalt at energies of < 4.0 MeV for a total of only three incident energies and the excitation of only a few of the possible states (2,9). Several $(n;n'\gamma)$ studies have been reported (10,11,12). Results from these latter are not easily re-

lated to inelastic neutron scattering cross sections nor are they particularly consistent. Recent measurements have well defined the total neutron cross section of cobalt at energies of \sim 0.2 MeV (13,14) and from \sim 0.4 to 20.0 MeV (15). Good resolution measurements are apparently not available in the region \sim 0.2 to 0.4 MeV.

It was the objective of this study to: 1) verify the energy-averaged magnitudes of the reported total cross sections in the energy range \sim 2.0 to 5.0 MeV, 2) provide, together with previously reported work from this laboratory (2), a definitive knowledge of elastic neutron scattering to \sim 4.0 MeV, 3) improve the knowledge of excited structure and associated inelastic neutron scattering, 4) develop a comprehensive optical-statistical model descriptive of measured values and suitable for extrapolation up to 20.0 MeV, and 5) utilize the experimental and calculational knowledge to construct an evaluated data file in the ENDF format. Subsequent portions of this paper are addressed to these five objectives.

II. EXPERIMENTAL METHODS

All of the experimental measurements employed high-purity metal cylinders of natural cobalt. In the total cross section measurements neutrons were incident on the cylindrical base, and the sample thickness was selected to provide transmissions of 50% or greater. The scattering measurements employed 2.0 cm diameter and 2.0 cm high cylinders with neutrons incident on the lateral surface.

The total cross section results were deduced from the observed transmissions of approximately monoenergetic neutrons through the cobalt samples. The scattering measurements employed an unusual 10-angle fast neutron time-of-flight apparatus. The details of the apparatuses, the experimental procedures and the data handling and processing have been

amply described elsewhere and will not be reiterated here. Detailed descriptions can be found in Refs. 16 and 17.

III. EXPERIMENTAL RESULTS

1. Total Neutron Cross Sections

The total neutron cross sections were determined at energies of \approx 2.0 to 4.5 MeV. Fast neutron time-of-flight techniques were used to suppress the background and other experimental perturbations. The statistical accuracy of the measured values was \approx 1%. The incident neutron energy resolutions of \approx 3.5 keV neither averaged the expected resonance structure nor fully resolved it. As a consequence the measured values fluctuated with energy. When averaged over \approx 50 keV energy intervals, they were comparable with the measured neutron scattering cross sections, discussed below, and provided a test of the internal consistency of the various partial cross section measurements. The total neutron cross section results are summarized and compared with the results of Cierjacks et al. (15) in Fig. 1. The energy-averages of the two sets of measurements are in good agreement. However, the energy resolution of the present results was about a factor of three better than those of Ref. 15, (3.5 keV via 0.07 nsec/meter or \approx 10 keV at 3.0 MeV) thus may have been more sensitive to inherent cross section fluctuations.

2. Elastic Neutron Scattering Cross Sections

The neutron scattering cross sections were deduced from the observed neutron velocity spectra measured concurrently at 10 scattering angles. The incident neutron resolution was \approx 50 keV and the scattered neutron resolution \gtrsim 0.4 nsec/meter. Measurements were made at \leq 0.1 MeV incident neutron energy intervals from 1.8 to 4.0 MeV, generally in two angle sets resulting in a total of 16 to 20 differential cross sections at each

incident energy distributed over the angular range 20 to 155 degrees.

The energy-dependent sensitivities of the detectors were experimentally determined from measurements of the H(n,n) scattering process and the absolute magnitudes of all the scattering cross sections were determined relative to the H(n,n) cross sections as given in Ref. 18. All the measured scattering results were corrected for flux attenuation, multiple event and angular resolution perturbations using a Monte-Carlo procedure (19).

The measured differential elastic scattering cross sections were least-square fitted with an expansion of Legendre polynomials from which the angle-integrated elastic scattering cross sections were deduced. Generally, the fitting procedures utilized only the measured data and resulted in zero-degree extrapolated cross sections exceeding "Wicks Limit" (20). In a few instances the model, described below, was used to introduce a cross section value at 180 degrees so as to assure a good behavior of the extrapolation of the polynomial fit to 180 degrees. The experimental elastic scattering cross sections and the corresponding Legendre fits are summarized in Fig. 2.

The statistical uncertainties of the individual differential elastic scattering values were in the range 1% to 10% with the larger value pertaining to the distribution minima. In addition there were systematic uncertainties associated with the correction procedures and normalization. The cumulative systematic error was estimated at 5% to 8% dependent on the quality of the particular measurement. Thus the total uncertainty in the differential values was \approx 5% to 13%. The uncertainty in the angle-integrated values was estimated to be 5% to 8%. The consistency of the data taken over a two year period indicated that the above uncertainty estimates

are conservative.

The present elastic scattering results are in good agreement with those reported by Holmqvist and Wiedling (3) at 2.0, 2.4, 3.0, 3.4 and 4.0 MeV and with the 4.0 MeV results of Gorlov et al. (6). The agreement with the 3.2 MeV results of Ref. 5 and the 3.7 MeV results of Ref. 7 is less satisfactory. Representative comparisons are shown in Fig. 3. The present results reasonably extrapolate to the lower energy values previously reported from this laboratory by Smith et al. (2) as illustrated in Fig. 2.

3. Inelastic Neutron Scattering Cross Sections

Inelastic scattering cross sections were determined concurrently with the elastic scattering cross sections. The scattered-neutron energy resolutions were sufficient to resolve many of the reported ⁵⁹Co states to excitations of \approx 2.6 MeV. The observed excitation energies were determined from the known incident energies and the measured neutron flight-times and flight-paths and verified by observation of known inelastic neutron processes (e.g. the excitation of the 846 keV state of ⁵⁶Fe). The measured excitation energies were uncertain to \gtrsim 10 keV and generally not as precise as those previously reported from ($p;p'$) and ($n;n';\gamma$) studies (1,10,11,12). Therefore, the energy determinations of the latter were accepted as the more accurate.

The first four reported excited states (1.099, 1.190, 1.291 and 1.434 MeV) were clearly observed in the present experiments. An observed "state" at 1.465 MeV was attributed to the reported doublet of states at 1.460 and 1.481 MeV. Neutrons corresponding to the next three reported states (1.744, 2.061 and 2.087 MeV) were observed and neutrons due to a "state" at 2.16 MeV were attributed to the reported triplet of states at 2.153, 2.183 and 2.206 MeV. Neutrons corresponding to the reported state

at 2.397 MeV were evident and a broad neutron group was associated with the known states at 2.479, 2.541 and 2.585 MeV. These correlations of presently measured and previously reported structure are summarized in Table 1. Generally, the energies of the structure observed in the present experiments are consistent with those previously reported from other measurements.

The observed differential inelastic cross sections were nearly isotropic. The measured angular distributions were least-square fitted with low order ($\leq P_2$) Legendre polynomial expansions from which the angle-integrated cross sections values were deduced. The uncertainties associated with the angle-integrated values were subjectively estimated from the statistical error of the measurements, the systematic uncertainties and the experimental reproducibility. The combined uncertainties were generally in the range 10 to 20% or 10 mb, whichever was larger. These uncertainties rapidly increased as the neutron energies decreased below 500 keV and cross-section results were not accepted when they corresponded to neutron energies of less than 500 keV.

The measured angle-integrated inelastic neutron scattering cross sections for the excitation of the above states are summarized and compared with previously reported values in Fig. 4. The total inelastic scattering cross sections deduced from the present measurements are consistent with the above determinations of elastic scattering and total cross sections and are in good agreement with the neutron measurements made at this laboratory a decade ago (2), with those reported by Cranberg and Levin at 2.5 MeV (9) and with the extrapolation of the higher energy values of Kinney and Perey (4). The agreement with cross sections deduced from the observation of gamma-rays emitted following the scattering process is less satisfactory. Results reported from the $(n;n'\gamma)$ measurements of Refs. 10, 11 and 12 tend to be larger than those of the present

work and those obtained from other direct neutron measurements. This is not unexpected as the reported results are generally gamma-ray production cross sections, not simply related to the inelastic neutron scattering cross sections.

IV. INTERPRETATION

Optical-model (21) and compound-nucleus (22) concepts were employed with the objectives of: 1) providing a comprehensive physical model suitable for experimental extrapolation requisite to the provision of complete data sets for applied use and 2) improving the physical understanding of the excited structures of ^{59}Co .

1. The Optical Potential

The selection of the spherical optical potential was based upon comparisons of measured and calculated: 1) total neutron cross sections in the energy range 0.1 to 20.0 MeV, 2) energy-averaged differential elastic scattering cross sections in the energy range 0.3 to 8.0 MeV and 3) $\ell=0$ strength functions at the low-energy limit. The emphasis was essentially in the above order. The choice of the optical-potential was not influenced by consideration of inelastic neutron processes. A number of optical potentials were examined in the context of the above criteria including those of: Perey and Buck (23), Lambropoulos et al. (24), Agee and Rosen (25), Holmqvist and Wiedling (3) and Moldauer (26). The latter was found very suitable, when inclusive of the potential energy dependence of Engelbrecht and Fiedeldey (27), and was the basis for subsequent detailed parameter adjustments. These adjustments were based upon subjective judgements made in an essentially real-time computational environment. The finally "selected" parameters were

$$\begin{aligned} v_{\text{real}}^0 &= 46.0 \text{ MeV} & R_{\text{real}} &= 5.118 \text{ F} & a_{\text{real}} &= 0.65 \text{ F} \\ w_{\text{imag.}}^0 &= 14.0 \text{ MeV} & R_{\text{imag.}} &= 5.618 \text{ F} & b_{\text{imag.}} &= 0.6 \text{ F} \end{aligned} \quad (1)$$

$$v = {}^0 v - 0.33 E \text{ (MeV)}$$

$$v_{so} = 7.0 \text{ MeV}$$

$$w = {}^0 w - 0.1 E \text{ (MeV)}$$

where the real potential is a Saxon-Woods form, the surface-imaginary potential a Gaussian form, and the spin-orbit potential a Thomas form (21).

The calculated total neutron cross sections are descriptive of the energy-averaged experimental values in the region of large fluctuations (i.e. $E \approx 2.0$ MeV) and at higher energies (to 20.0 MeV) differ from the measured values by no more than 2% as illustrated in Fig. 5. Below several MeV compound-elastic scattering contributions were appreciable and were calculated using the Hauser-Feshbach formula (22). Above about 5.0 MeV the elastic scattering should be essentially equivalent to "shape" scattering. Between the two extremes, compound-elastic contributions were not well defined due to uncertain inelastic-channel competition. In the present calculations, the compound-elastic contribution was linearly interpolated from the reasonably calculated value at 3.0 MeV to an assumed zero contribution at 5.0 MeV. The results of elastic scattering calculations using the above potential and procedures are compared with some of the present and previously reported experimental results in Fig. 3. At low energies (≈ 1.0 MeV) the agreement is good when the experimental results are considered in the context of a 100 keV energy-average of the evident fluctuations. As the energy increases from 1.5 to 4.0 MeV the fluctuations of the experimental elastic scattering cross sections decrease and the agreement of individual measured distributions with calculation becomes very good.

The calculated distributions are reasonably descriptive of the 6.0 and 8.0 MeV elastic scattering angular distributions reported by Holmqvist and Wiedling (3) and by Kinney and Perey (4). The angle-integrated magnitudes, the general shapes and the position of the diffraction minima are

well represented by the calculation. The magnitude of the calculated second maximum near 90 deg. is too large by 20% to 25%. Potentials explicitly selected to describe high-energy elastic scattering gave an improved agreement with experimental elastic angular distributions at energies from 5.0 to 8.0 MeV but were less satisfactory in the context of the broader scope objectives set forth above. The elastic scattering calculations were extended to 14.0 MeV where only a qualitative description of the magnitude and shape of the experimental values of St. Pierre et al. (8) was achieved. The calculated distribution at 14.0 MeV was characterized by a more clearly defined diffraction pattern than observed experimentally. Calculated elastic scattering polarizations were qualitatively consistent with those reported from experiment (28).

The potential of Eq. 1 is very similar to that proposed by Moldauer in that the absorption is centered somewhat outside the mean radius of the real potential. The Moldauer potential gives a good description of $\ell=0$ strength functions thus it is not surprising that Eq. 1 leads to an $S_0 = 3.06 \times 10^{-4}$, in good agreement with the value $3.0 \pm 1.0 (x 10^{-4})$ deduced from low-energy resonance measurements (29).

Though other potentials gave a description of certain aspects of the neutron interaction with ^{59}Co (e.g. strength functions, total cross sections, or high-energy elastic cross sections) equal or superior to that obtained with Eq. 1 none were found as suitable in the broad reaction and energy scope of the present objectives.

2. Statistical Model, Excited Structure and Inelastic Scattering

The statistical model and the Hauser-Feshbach formula were employed in the interpretation of the inelastic neutron scattering cross sections (22). The above optical potential was used to determine the total reaction cross sections. The Hauser-Feshbach formula was not corrected for

fluctuation effects (30) since it was felt that other uncertainties often masked such effects (primarily uncertainties in level structure). As a consequence, the calculated results may have tended to overestimate the magnitudes of the processes, particularly near the reaction thresholds. The excited structure of cobalt is summarized in Ref. 1. This information was derived from the study of a number of reaction processes which tended to select low ℓ -value processes and thus may not give a comprehensive view of the actual structure. In any event, above ≈ 2.0 MeV knowledge of cobalt excited structure is largely confined to energetics and becomes increasingly uncertain with correspondingly questionable calculational results. Therefore, the present calculations were judged unreliable above ≈ 3.0 MeV and were terminated at 4.0 MeV.

Cobalt has one proton hole in the $f_{7/2}$ shell; thus it is attractive to model its structure with a single nucleon hole strongly coupled to a spherical core in the manner of Mottelson and Nilsson (31) and as applied in the lighter mass region; for example by Litherland et al. (32). There are a number of indications that such a simple model is appropriate. The quadrupole moment (e.g. the deformation) rapidly increases as proton holes are introduced into the closed $f_{7/2}$ shell (33). Assuming a prolate deformation with eccentricities of > 0.15 , a sequence of negative parity states associated with $f_{7/2}(7/2-[303])$, $f_{5/2}(1/2-[310])$ and $p_{3/2}(1/2-[312])$ single-particle states and corresponding rotational bands is predicted and is consistent with the observed preponderance of low-lying negative parity states in cobalt (31, 34). Positive parity states should occur at higher excitation energies commencing with a band based upon the $g_{1/2}(1/2+[440])$ particle state. This is consistent with the first observed positive parity ($1/2^+$) state at 2.72 MeV. The excitation energies of the states in the above model are simply given by

$$E(J) = A [J(J+1) + a(-1)^{J+\frac{1}{2}}(J+\frac{1}{2})] + B [J(J+1) + a(-1)^{J+\frac{1}{2}}(J+\frac{1}{2})]^2 \quad (2)$$

where A is the band constant, "a" the decoupling parameter (\neq zero in the $K=\frac{1}{2}$ band) and B is the vibrational-rotational interaction parameter (31). In the present application we assume the latter is negligible. Correlating results calculated from Eq. 2 with the measured values leads to the band structure and parameters given in Fig. 6. The calculated energies and J^π values are in agreement with the reported measured values to excitations of ≈ 2.0 MeV. The A parameter is defined as $\hbar^2/2I$ (I =moment of inertia) and the A calculated from an estimated I value is qualitatively similar to that deduced from Eq. 2. and given in Fig. 6. This model particularly suggests that the J^π value of the 1.19 MeV state is $9/2^-$ in accord with one of the alternate choices deduced from previous work. Both the model and the comparable experimental values become increasingly unreliable and/or deficient as the excitation energies increase above ≈ 2.0 MeV. Attempts to relate reported gamma-ray transitions with the model were not rewarding as the experimental evidence is neither comprehensive nor entirely consistent (1).

The inelastic neutron scattering cross sections were calculated using a "selected" level sequence consistent with the above model and with an "alternate" sequence assembled from the optional parameters reported in the literature (1). Above excitation energies of ≈ 2.0 MeV the two sequences were essentially identical and taken from Ref. 1 with additional and speculative J^π assignments where necessary. Both of these calculational sequences are given in Table 1. The calculated results are compared with the measured values in Fig. 4 and summarized as follows.

Both calculations gave essentially identical results for the excitation of the 1.099 MeV ($3/2^-$) state and both were in reasonable agreement with experiment considering the uncertainties of the measured values.

The excitation of the 1.19 MeV state calculated with the "selected" sequence ($J^\pi = 9/2^-$) was larger than the measured values and that calculated with the "alternate" sequence ($J^\pi = 5/2^-$) appreciably smaller. Fluctuation corrections tend to reduce both calculated results thus the "selected" sequence is to be preferred. This choice was more evident from comparison of calculated results with the composite measured values of 1.099 + 1.190 MeV states and 1.099 + 1.190 + 1.291 MeV states. Contributions from the 1.291 MeV state were small and consistent with both calculations and the composite values were better known due to reduced demands on experimental resolution.

The excitation of the 1.434 MeV state was observed but the cross section magnitudes were uncertain. The excitations of 1.460 and 1.481 MeV states were not individually resolved. Therefore, measured cross section magnitudes were only reliable in the context of the triplet of states (1.434, 1.460 and 1.481 MeV) and comparison with calculations was made on that basis. The two calculated results and the experimental values differ by very small amounts. Values of J^π for the 1.460 state $> 9/2^-$ and/or $< 5/2^-$ for the 1.481 state gave less acceptable results. Both calculations and the measured excitations of the 1.744 MeV were essentially identical.

The 2.061 and 2.098 MeV states were experimentally resolved at only one incident energy (2.9 MeV). The respective cross section ratio was $\approx 1:3$ in reasonable agreement with either calculation. The observed composite excitation of both states is best described by calculations based upon the "selected" sequence but the choice is marginal and does not clearly distinguish between alternate 5/2 and 7/2 spin options for the 2.061 MeV state.

Either calculation was consistent with the observed excitation of the 2.15 MeV (attributed to reported states at 2.15, 2.183 and 2.206 MeV) and of the 2.397 MeV states. A relatively large experimental uncertainty is associated with the excitation of the 2.5 MeV "state" and the contributing

structure is not well known. Therefore, comparisons of measured and calculated excitations are not particularly meaningful in this area.

Generally, the inelastic neutron scattering cross section calculations based upon the "selected" sequence of Table 1 and the above simple ellipsoidal structure model were descriptive of the observed values. The "alternate" sequence was less suitable for some excitations. In particular, comparison of calculation and experiment indicate that the J^{π} value of the 1.190 MeV state is $9/2^-$ rather than a previously reported alternative of $5/2^-$. Furthermore, the results tend to indicate J^{π} values for the 1.460 MeV state of $7/2^-$ or $9/2^-$ and for the 1.481 state of $5/2^-$ or $7/2^-$ thereby limiting previously suggested alternatives.

V. EVALUATION

1. Procedures, Practices and Scope

The objective was a contemporary and comprehensive evaluation of fast neutron processes in cobalt over the energy range 0.1 to 20.0 MeV and suitable for neutronic calculations in a wide range of applications. The ENDF/B, MAT-1118 (35) evaluated file was explicitly used to extend the present work from 0.1 MeV to essentially thermal energies. The present complete evaluated data file is given in the ENDF format in the Appendix.

The present evaluation considers the neutron-induced processes listed in Table 2. The respective Q-values were obtained directly from experimental measurements or from the mass tables of Wapstra and Gove (36) as judged most suitable. Primary emphasis was given to experimental cross section values. Theoretical calculations were used to verify the physical validity of and to extrapolate and interpolate the measured values. The selection and weighting of the experimental values were subjectively based upon a number of criteria pertinent to the particular

contexts (see subsequent discussion). Gamma-ray production cross sections were not included in this evaluation as experimental knowledge of the process in cobalt is fragmentary and theoretical estimates require a knowledge of the properties of highly excited states. The latter information is uncertain and as a consequence theoretical estimates of the gamma-ray production cross sections would not be in the quantitative spirit of the present evaluation endeavor.

Subsequent portions of this section deal with the specific evaluation of the processes listed in Table 2.

2. $\sigma_t(n)$, Total Neutron Cross Section

The present evaluation gives emphasis to both magnitude accuracy and structure resolution. With these criteria, the most suitable measured total cross sections in the range 0.1 to 0.12 MeV were judged to be those of Bilpuch et al. (13) and they were directly employed in this evaluation. Similarly, the results of Rainwater et al. (14) were utilized in the range 0.12 to 0.216 MeV. These two data sets provide the best resolution to $\sqrt{0.2}$ MeV and they are relatively consistent in the region of overlap.

From 0.36 to 20.0 MeV the present evaluation is based upon the measurements of Cierjacks et al. (15). The energy resolution of this data is generally unsurpassed and a careful comparison with the results of the present work (see Fig. 1) and with a number of lesser resolution values found in the literature (37-45) indicated that the energy-averaged cross section magnitudes of the Cierjacks et al. results were excellent. In the energy range of interest the Cierjacks et al. results consist of more than 6000 data points. This profusion of information cannot be easily handled in a practical evaluation and is more than necessary to define the observed structure. Therefore, the volume of these results was truncated by about a factor of five. The truncation was carried out by graphically

selecting experimental points in such a way as to provide a linearly-interpolated cross section essentially identical to that reported by the original authors. An alternate attempt to use spline fitting was judged to give no better results and was tedious and, therefore, was abandoned. The point selection was employed from the lowest energies of the set to 3.0 MeV. Above 3.0 MeV the experimental values fluctuate by small amounts, often within experimental uncertainty. Therefore above 3.0 MeV the experimental values were averaged over increasingly coarse energy increments to obtain the evaluated result. These "smoothed" values retained a good consistency with the basic data.

The interval \approx 0.21 to \approx 0.36 MeV was a problem as, apparently, no high resolution measurements have been made in this fluctuating region. At both higher and lower energies structure is grossly evident (14, 15). In the absence of suitable experimental information the theoretical statistical R-matrix method of Moldauer (46) was used to interpolate between 0.21 and 0.36 MeV. The calculations utilized the optical potential of Section IV to determine the average resonance properties. The latter, combined with the known statistics of resonance widths and spacings (47, 48), were applied in a random manner in an R-matrix calculation of the cross section. The "resolution" of the calculated cross section (0.1 keV) was a great deal better than obtainable experimentally at these energies. The calculated result was compared with the measured values of Cierjacks et al. as illustrated by the 0.50 to 0.55 MeV energy interval of Fig. 7. When the calculated result was averaged over an \approx 0.8 keV "resolution" function (similar to that of the experiment) it was remarkably statistically-similar to the measured results. This is visually evident in Fig. 7 and was verified by auto-correlation analysis. After the good comparison of measured and calculated results in the experimentally known region, the

calculational method was applied to the interpolation over the unknown region 0.216 to 0.360 MeV. Smoothly joined, the calculated and measured values blended very well.

In some special-application contexts, such as deep neutron penetration in bulk media, Fig. 7 has special interest. Though the 0.8 keV average of calculated values is very similar to the measured result, the "infinite" resolution cross section deduced by calculation is characterized by far deeper minima and larger maxima than shown by the best experiments. The calculated result should be more truly statistically representative of the resonance structure. An apparent consequence is far more transparent "windows" than indicated by experiment, or this evaluation. Applications sensitive to "window" and similar resonance effects should use measured and this evaluated data with caution. An "infinite" resolution evaluation is not realistic as neither measurements nor theory are sufficiently defined over the wide energy range needed for many applications.

The complete evaluated total cross section is illustrated in Fig. 8 together with the corresponding energy-averaged content of ENDF, MAT-1118. At energies of less than 0.2 MeV the two evaluations are essentially identical (by definition so below 0.1 MeV). Above 0.2 MeV, the latter shows none of the structure of the present evaluation. In addition the energy-averaged values of the two evaluations are discrepant in some energy ranges; notably near 1.0 MeV where the differences are 15% and more. From Fig. 8, it is difficult to distinguish the interpolated region theoretically deduced in the manner described above.

3. $\sigma(n;n)$, Elastic Neutron Scattering

Apparently the only comprehensive experimental data on neutron scattering at energies of < 0.3 MeV, are the total scattering cross sec-

tions reported by Langsdorf et al. (49). Therefore, in this low-energy region the evaluation relies on the model of Section IV, above, and total scattering results of Ref. 49 to obtain the relative energy-averaged elastic scattering cross sections. These evaluated results will not reproduce detailed resonance fluctuations. The comprehensive experimental results of Smith et al. (2) are available in the energy range 0.3 to 1.5 MeV. They are in good agreement with other reported experimental values (e.g. those of Cox (50) and Walt et al. (51) and the experimental resolution of \approx 20 keV is sufficient to define intermediate-resonance-structure effects. Therefore, the results of Smith et al. were explicitly employed in the evaluation. At energies of 1.5 to 4.0 MeV the present experimental results (see Section III) provide a comprehensive knowledge of elastic scattering and are consistent with previously reported experimental information. The present results were explicitly employed in this evaluation. The results of Kinney and Perey (4) defined the evaluation at \approx 5.0 MeV with extrapolation in angle using the model of Section IV as necessary. Kinney and Perey (4) and Holmqvist and Wiedling (3) have reported a number of measured elastic scattering results over the energy range \approx 6.0 to 8.0 MeV. Some of these distributions are shown in Fig. 3. The Kinney and Perey results emphasize forward angles. Those of Holmqvist and Wiedling extend over a wider angular range but are less definitive at forward angles. Generally, the two sets of results are in reasonable agreement (see Fig. 3) but the Kinney and Perey values tend to be a little larger at forward angles (as also noted in Ref. 4). This is a significant discrepancy since the angle-integrated cross sections are sensitive to the forward-angle values as are the legendre polynomial fits to the measured data. With no clear choice between the two sets of data and with rather unsatisfactory results from the averages of the two sets of values this evaluation em-

ployed, as an alternative, the model calculations described in Section IV and illustrated in Fig. 3. These calculational results have their shortcomings, as discussed in Section IV, but they tend to be in regions of low "importance". The calculated values, which are a good compromise between measured results at forward angles, reasonably extrapolate the measured values to large scattering angles and are physically licit; e.g. satisfy "Wicks Limit" (20). The model results were also used to extend the evaluation from 8.0 to 20.0 MeV. Within this region apparently only a single experimental measurement has been reported; the \approx 14.0 MeV angular distribution measured by St. Pierre et al. (8). The angle-integrated elastic scattering cross section given by the model was 1.47b, about 12% larger than the value deduced in Ref. 8 from measurements but not appreciably outside the estimated experimental uncertainty. The discrepancy is largely due to forward-angle values which dominate the determination of the angle-integrated quantity. There are only several measured differential values in this important region and they may not be particularly consistent. The calculated 14.0 MeV results show a more pronounced diffraction pattern than experiment but the angle-averaged values in the regions of small cross sections are similar. These various considerations lead to the acceptance of the calculated elastic scattering angular distributions for the high-energy (> 8.0 MeV) portion of the present evaluation.

The angular dependence of the differential elastic distributions was expressed in terms of f_ℓ coefficients defined by

$$\frac{d\sigma}{d\Omega} = \frac{\sigma}{2\pi} \sum_{\ell=0}^n \left[\frac{1}{2\ell+1} f_\ell P_\ell \right] \quad (3)$$

where P_ℓ are legendre polynomials and σ values were obtained from a least-square fit of Eq. 3 to the above measurements or, alternatively, from the

model calculations. In some instances calculated 180 degree values were added to the experimental results to assure a good behavior as described in Section IV. In regions of strong fluctuations and reasonably known inelastic scattering cross sections (i.e. ~ 3.0 MeV) the angle-integrated elastic cross sections were treated as free parameters adjusted so as to assure consistency between the evaluated total and partial cross sections. As a consequence, the evaluated elastic scattering cross sections reflected the structure of the high-resolution total cross sections. This is not necessarily a sound approach when non-elastic channels are open at higher energies. However, there was little pragmatic alternative as the structure was predominantly at low energies and was well beyond the resolution of the direct elastic scattering measurements. However, the energy-average of the evaluated elastic cross sections was reasonably consistent with experimental values obtained with lesser resolutions. In the "smooth" total cross section region ($E > 3.0$ MeV) the evaluated total and elastic scattering cross sections were used to deduce the non-elastic cross sections. The latter consisted of a number of reaction cross sections most of which made small contributions. A major contribution was the continuum inelastic scattering cross section. The latter was deduced from the non-elastic cross section by subtracting the other partial cross section contributions (see subsequent discussion). This procedure was judged reasonably reliable as the remaining partial cross sections were small, with the exception of the $(n;2n)$ cross section, and the latter is well known.

The evaluated differential elastic scattering cross sections are summarized in Fig. 9. The numerical values including cross sections, f_ℓ values, μ_ℓ , ξ and γ are given in the file of the Appendix. The present evaluated results are compared with those of ENDF/B, MAT-1118 in Fig. 10.

They differ in structure and in magnitude from those given in MAT-1118, over a wide energy range.

4. $\sigma(n;n')$, Inelastic Neutron Scattering Cross Sections

a. Discrete Excitation Cross Sections

The evaluated discrete excitation cross sections were largely based upon the results of direct neutron measurements. Theoretical calculations offered some guidance. Results of $(n;n';\gamma)$ measurements generally were not utilized as they are either ambiguous or somewhat inconsistent. Some of the observed cross sections were believed to consist of several unresolved components. In these cases theory was not used to give further definition as it was felt that such detail would be speculative, of little merit in most neutronic applications and not consistent with the objective of conciseness. The inelastic neutron processes considered in this evaluation are summarized in Table 2. The respective thresholds are taken from precise values found in the literature (1) or from the present measurements as appropriate. The Q-values are directly associated with those of Table 1 (e.g. the evaluation combines 1.434, 1.460 and 1.481 MeV states and 2.061 and 2.098 MeV states). Below 4.0 MeV the evaluation relies primarily upon the present work with the additional values of Smith et al. (2) at low energies and the ≈ 2.5 MeV results of Cranberg and Levin (9). Above 4.0 MeV the evaluation relies primarily upon the results of Kinney and Perey (4). The highest energy-threshold considered was 2.5 MeV and the upper energy limit of the discrete evaluation was 8.0 MeV. The spectra were assumed isotropic. This was a valid assumption at incident energies of less than 4.0 MeV as the measurements of the present work (Section III) showed only small deviation from isotropy. At higher energies (6.0 to 8.0 MeV) the work of Kinney and Perey (4) indicates that anisotropy can be appreciable. However, at these

energies the discrete cross section contributions are small therefore the effect of the uncertain assumption of isotropy should not be large in most applications. In special cases, at higher energies and where the angular distribution of the emitted neutron can be important this evaluation should be used with caution.

The evaluated results were subjectively deduced from the measured values considering experimental accuracies, consistency and theoretical guidance. They are summarized in Fig. 11 and compared with the experimental foundation in Fig. 4. The evaluation is, obviously, representative of the results obtained in direct neutron measurements. The discrete portion of the present evaluation is compared with that of ENDF, MAT-1118 in Fig. 12. For these comparisons the ENDF values were combined in such a way as to correspond to the energy definition of the present work. MAT-1118 is essentially a calculated result with excited state energetics very similar to those given in Table 1. In some areas the magnitudes of the two evaluations differ by a factor of two or more (notably in the excitation of the first few states). At higher energies MAT-1118 does not show the definition of the present results.

b. Continuum Inelastic Scattering Cross Sections

The magnitudes of the continuum inelastic cross sections were treated as essentially free parameters adjusted to assure consistency between partial reaction cross sections ($Q \neq 0.0$) and the non-elastic cross sections. The latter follow directly from the total and elastic cross sections as described above. The resulting evaluated continuum inelastic cross sections are shown in Figs. 11 and 13. The total inelastic cross section of the present evaluation is compared with values from ENDF, MAT-1118 in Fig. 10. The two evaluations differ by appreciable amounts. The effect of the onset of the large ($n,2n$) cross section

at \approx 10.5 MeV is clearly evident in Fig. 13. In addition the present evaluated results increase slightly as 20.0 MeV is approached. This may be an artifact of the derivation but it is consistent with slowly increasing contributions from $(n;n'p)$ and $(n;n'\alpha)$ processes.

The continuum emission spectra were approximated with an evaporation distribution (52) given by

$$N \sim E \exp(-E/T) \quad (4)$$

where the "temperature" $T = \sqrt{\frac{E}{a}}$ and "a" is a level density parameter.

This description is not particularly suitable in the present context as the measurements of Kinney and Perey (4) indicate appreciable structure in the evaporation spectrum even at incident energies above 8.0 MeV. This structure is due to residual and partly resolved excitations of discrete states and also, possibly, to persistent "clumping" of excited states in cobalt even at relatively high energies. The latter effect might be expected from single-particle and collective modes. In any event, the statistical assumptions underlying Eq. 4 are not strictly applicable to experimental interpretation in this instance. This should be recognized when the present evaluation is utilized in applications which may be sensitive to structure in the continuum emission spectrum.

The temperatures of Eq. 4 were deduced from the results of Tsukada et al. (53) and of Kinney and Perey (4). The latter authors have tabulated their results as detailed spectral distributions at incident energies of \approx 4.0 to 8.0 MeV. These were least-square fitted with Eq. 4 to obtain the respective temperatures using two procedures: 1) fitting all data reported by Kinney and Perey, and 2) fitting this data truncated to exclude high neutron energies where structure was most prominent. The temperatures resulting from the first of these fitting procedures are compared with the temperatures reported by Tsukada et al. in Fig. 14.

An additional 14.0 MeV value reported by Arnold and Bunyard (54) is included in the figure. The latter appears anomalous and was not used in the present evaluation. The results of Tsukada et al. and of Kinney and Perey have an appreciable common energy range in which the temperatures deduced from the two sets of measurements are similar. However, the energy dependence of the temperatures of the two sets of measurements is different (a \approx 5.6 MeV⁻¹ of Ref. 4 and a \approx 7.0 MeV⁻¹ of Ref. 53). In view of the evident structure and marginal validity of Eq. 4 in the present context, it was difficult to logically choose between the two sets of data. The discrepancy was not improved by using the more limited energy-scope of the second fitting procedure outlined above. Therefore, the level parameters "a" derived from the individual energy values of both sets of data were simply averaged (equal weighting) to obtain the $a = 6.4$ MeV⁻¹ used in the present evaluation. The resulting energy dependent temperature is a reasonable compromise between the two sets of measurements as shown in Fig. 14. The present temperatures are slightly larger than those of ENDF, MAT-1118 which tend to be descriptive of the values given in Ref. 53.

The present evaluation assumes that the continuum emission spectrum is isotropic. It is recognized that at higher energies this is a crude assumption as direct processes certainly are contributing factors and will lead to anisotropy. Indeed, anisotropies of \approx 25% (increase of 30 deg. cross section above 90 deg. values) have been observed by Prud Homme et al. (55). The assumption of isotropy employed in the present evaluation should not be a matter of concern in most neutronic applications.

5. $\sigma(n;\gamma)$, The $(n;\gamma)$ Reaction

The cross sections for this process have been measured by activation and by prompt gamma-ray detection techniques. There is a metastable state

in the residual ^{60}Co nucleus but the isomer ratio has been determined at a number of incident energies by Paulsen (56) and thus the total (n,γ) cross section can be reasonably deduced using activation techniques. Johnsrud et al. (57) have determined the isomer activation cross section at a number of energies up to ≈ 2.0 MeV. Their results have been corrected to obtain the total (n,γ) cross section using the isomer ratios of Paulsen. Paulsen has measured the (n,γ) cross sections at approximately 2.0, 6.0 and 14 MeV. The Johnsrud et al. and Paulsen measurements are in agreement in the region of overlap near 2.0 MeV. Rigaud et al. (58) determined a 14.8 MeV cross section from observation of prompt gamma-ray emission. Their value is only about half that of Paulsen but both are small ($< 2.5\text{mb}$).

The available experimental information is sparse but it does provide reasonable guidance for the present evaluation illustrated in Fig. 15. The evaluation follows the small structure near 0.5 MeV reported in Ref. 57. The interpolation from measurements at 6.0 to those at 14.0 MeV is essentially linear with little slope. The available experimental information seems to preclude any appreciable giant resonance behavior between 2.0 and 14.0 MeV. Above 14 MeV the evaluation slowly increases. Such a behavior is qualitatively consistent with a small contribution from direct capture. The evaluation compromises between measured results near 14.0 MeV. The evaluation has some uncertainties but the cross sections are generally small and as a consequence creditable errors will not seriously influence most applications.

The present (n,γ) evaluation is grossly different from that of ENDF, MAT-1118 as illustrated in Fig. 15. No experimental evidence justifying the ENDF result over much of the energy range could be found. Whether or not the ENDF result is suitable at energies below 0.1 MeV is not certain

and that energy region is beyond the energy-scope of the present evaluation.

6. $\sigma(n;2n)$, The $(n;2n)$ Reaction

The product nucleus, ^{58}Co , has an isomeric state which, fortunately, decays primarily by internal conversion. Thus, with reasonable care, activation methods have been used to give good results.

The available experimental information was divided into three sets. The first of these was judged most reliable by experimental error, detail and consistency, both internally and with other selected sets. In this first group were the results of Cabe et al. (59), Granger and Longneve (60), Bormann et al. (omitting the lowest energy points) (61), Wenusch et al. (62), Bormann et al. (63), Wenusch and Vonach (64), Paulsen and Liskien (65) and Goodwin and Carter (66). The second set of data was given less consideration in the evaluation and consisted of the results of Decowski et al. (67), Weigold et al. (68) and Jeronymo et al. (69). The third set of data, consisting of the results of Refs. 70 to 73, was not accepted for this evaluation due to large discrepancies with the body of available information and/or large uncertainties. In some instances the values of the third set were not reasonably consistent with systematics (74) and/or were obviously much too small. The experimental information of all three sets is summarized in Fig. 16.

Giving most weight to the first data group (above) and, particularly, that of Ref. 65 (as it is detailed and of high precision) a curve was constructed through the measured values. This curve is representative of experimental values as shown in Fig. 16 and was used in the present evaluation. The choice of this curve was subjective. However, more logical approaches may be deceptive in this instance as some data, reported with the highest precision, is obviously in error. Furthermore, some merit

should be given to demonstrated reliability of particular laboratories and/or methods. These are subjective judgements.

Apparently the energies of the emitted neutrons have not been measured. Therefore, we assume an evaporation distribution with a temperature somewhat "softer" than that of the ($n;n'$) process. The present evaluation and that of ENDF, MAT-1118 are compared in Fig. 16. There is not a great deal of difference though the present evaluation clearly is more descriptive of measurements at lower energies.

7. $\sigma(n;3n')$, The ($n;3n'$) Reaction

The threshold for the reaction is 19.35 MeV and emperical estimates by Pearlstein (75) indicate cross section values equivalent to or smaller than those of the ($n,2n$) process over much of the energy range of interest. In view of the small cross section and high threshold the process was not included in the present evaluation.

8. $\sigma(n;p)$, The ($n;p$) Reaction

The product nucleus ^{59}Fe decays by β^- emission to ^{59}Co with a 45 day half life. The subsequent and dominant gamma-rays have energies of ≈ 1.1 and 1.29 MeV and no isomeric states are involved. Thus the (n,p) process can be reasonably studied using activation techniques. In view of these simple processes it is odd that there is such a paucity of experimental data.

The available experimental information is summarized in Fig. 17. Results of Allan (75), Storey et al. (77), Preiss and Fink (73) and Weigold (68) near 14.0 MeV are consistent. The result of H. Vonach and J. Munro (78) is somewhat lower. The emulsion results of Allan (79) and the direct particle detection results of Hassler and Peck (80) at 14.0 MeV are much lower than other values in this energy range. The direct particle detection technique probably is more uncertain than the activa-

tion method. Therefore, the values of Refs. 79 and 80 were not used for cross section determination. Near threshold only the recent measurements of Smith and Meadows (81) define the cross section. The results of Jeronymo et al. (69) extending from 13 to 20 MeV appear systematically in error by a factor of $\approx \sqrt{2}$ X 8. In Fig. 17 they are renormalized to the 14 MeV values. There apparently is no experimental information in the range 6 to 13 MeV. Theoretical interpolation over this interval is of dubious merit as the results are dependent on unknown properties of highly excited states. However, some guidance can be obtained from an inspection of the (n,p) cross sections in similar nuclei, particularly $^{65}\text{Cu}(n,p)^{65}\text{Ni}$ and $^{60}\text{Ni}(n,p)^{60}\text{Co}$ (82,83). The thresholds are similar to that of $^{59}\text{Co}(n,p)$ and, when normalized to the 14 MeV $^{59}\text{Co}(n,p)$ values, the ^{65}Cu and ^{60}Ni cross sections are fairly consistent and reasonably extrapolate to the measured low-energy cobalt values. However, these normalized curves become increasingly higher than the results of Ref. 69 as the energy increases to 20 MeV. The magnitude of the results of Ref. 69 appear clearly in error and thus the relative energy dependence can be suspect. They are not accepted for this evaluation.

Following the above procedure a smooth curve was constructed through the measured $^{59}\text{Co}(n,p)$ values interpolated and extrapolated using the normalized $^{65}\text{Cu}(n,p)$ and $^{60}\text{Ni}(n,p)$ cross sections. This curve, shown in Fig. 17, was used for the present evaluation and is consistent with known systematics (84). For comparison, Fig. 17 also shows the ENDF, MAT-1118 $^{59}\text{Co}(n,p)$ cross sections. The ENDF evaluation differs appreciably from the present result, particularly in the region above ≈ 15 MeV where the ENDF result appears influenced by the uncertain values of Ref. 69.

The proton emission spectrum has been observed and is reasonably described as an evaporation distribution. Hassler and Peck (80) report a

proton "temperature" of 1.25 MeV including $(n;n'p)$ contributions.

Mohendra and Hans (85) report a temperature of 1.5 MeV. The results of Colli et al. (86) are consistent with both values. We assume a temperature of 1.25 MeV as a qualitative estimate of the emitted proton energy. It is further assumed that the proton emission is isotropic, certainly a simple approximation at higher energies. However, these proton emission properties apparently are not consistent with the present ENDF formats and thus were omitted from the numerical file.

9. $\sigma(n;n'p)$, The $(n;n'p)$ Reaction

This process has a higher energy threshold and its cross sections should be smaller than those of the (n,p) reaction. The latter assumption is supported by the ≈ 11 mb cross section at 14.0 MeV measured by Hassler and Peck (80). Such a cross section, while small, is not negligible. However, because of the absence of quantitative experimental values, it was not explicitly included in the present evaluation. From the neutronic point of view the emitted neutron will appear as a contribution to the continuum inelastic scattering cross sections. The omission of the recoil proton is not serious in view of the uncertainty in the (n,p) cross sections which will mask the small proton contribution from the $(n;n'p)$ reaction.

10. $\sigma(n;\alpha)$, The $(n;\alpha)$ Reaction

This reaction is easily studied using activation techniques. ^{56}Mn has no isomeric states and the half life is a convenient 2.58 hrs. The β^- decay to ^{56}Fe is well known with a subsequent prominent 0.846 MeV gamma-ray. There have been a number of measurements employing activation techniques. The results of Santry and Butler (87), Lauber and Malmksy (88), Preiss and Fink (73), Weigold et al. (68), Bormann et al. (excepting lowest energy values) (89), Jeronymo et al. (69), and Liskien and

Paulsen (90), are all in good agreement. The other reported results of Refs. 91 to 94 vary by \approx 10% to 20% or less from the main body of experimental information. Generally, this experimental information reasonably defines the (n',α) cross section to 20 MeV as illustrated in Fig. 18.

Breseti et al. (95) have evaluated the above experimental information. Simons and McElroy (96) extended the Breseti evaluation to lower energies using the results of macroscopic experiments to obtain cross sections as low as 4×10^{-4} mb at \approx 5.0 MeV. Such use of macroscopic results can be ambiguous but no comparable microscopic data is available in this low threshold region. The Breseti evaluation, as extended by Simons and McElroy, was judged in good agreement with experimental evidence as illustrated in Fig. 18. Therefore, it was accepted for this evaluation with a simple extrapolation from 17 to 20 MeV. The result differs only very slightly from the evaluation of ENDF, MAT-1118 as shown in Fig. 18. The present evaluation is in good agreement with systematic knowledge of $(n;\alpha)$ cross sections (97).

There is little experimental information dealing with the emitted alpha particles. We accept the nuclear temperature of 0.9 MeV reported by Patzak and Vonach (98) and assume isotropic emission. Both assumptions are only qualitatively accurate as there is some evidence for discrete alpha spectra and non-isotropic emission. In any event, the current ENDF format apparently is not inclusive of alpha-emission characteristics.

11. $\sigma(n;n'\alpha)$, The $(n;n'\alpha)$ Reaction

There have apparently been no experimental measurements of this reaction cross section. It should generally be smaller than the $(n;n'p)$ cross section and thus was not explicitly included in the present evaluation. The emitted neutron will appear as a contribution to the continuum

inelastic scattering cross sections.

12. $\sigma(n;d)$, The $(n;d)$ Reaction

Colli et al. (99) studied the $(n;d)$ process using particle detection and reported a cross section of 1.8 ± 0.6 mb at ≈ 14.0 MeV. It is unlikely that the cross section is appreciably larger than this small value within the energy range of the present evaluation. Therefore, this evaluation assumes that the cross section rises from threshold to a value of 2 mb at 15 MeV and then remains constant to 20.0 MeV. This is a very qualitative estimate but these cross sections are of minor importance in most applications.

13. $\sigma(n;t)$, The $(n;t)$ Reaction

Khurana and Govil (94) have measured the cross section for this reaction at 14.8 MeV with a result of 2.1 ± 0.2 mb. Measurements at essentially the same energy by Pouolarikas and Gardener (100) give a result several orders of magnitude smaller. For the present evaluation a compromise of 1 mb at 15 MeV was assumed. This is a very approximate (and possibly large) estimate. The process is included in the evaluation largely for the sake of completeness and the user should view the respective cross sections with caution.

14. $\sigma(n;^3\text{He})$, The $(n;^3\text{He})$ Reaction

The $(n;^3\text{He})$ cross section has been measured by Kumabe et al. (101) to be in the range 1-3 mb at approximately 15.0 MeV. Later essentially the same group reported a value of less than 0.1 mb attributing the larger result of the previous measurement to sample impurities (102). Thus the cross sections for this process appear very small and therefore were not included in the present evaluation.

15. $\sigma(n;2p)$, The $(n;2p)$ Reaction

This process has apparently not been observed. The threshold is

high and the cross section magnitudes should be appreciably smaller than those of the (n;p) process and the latter are not large. In view of the threshold energy and the probable small cross sections this process was excluded from the present evaluation.

Throughout the above evaluation procedures considerable attention was given to conciseness. As a consequence the quantity of information has increased by only \approx 10% beyond that of ENDF, MAT-1118 while including a wealth of new detail.

VI. CONCLUSIONS

The present measurements of elastic scattering from cobalt, together with those previously reported from this laboratory (2), provide a good experimental understanding of the process from 0.3 to 4.0 MeV. The inelastic neutron scattering measurements lead to a much improved definition of this process to incident energies of 4.0 MeV. Total cross section measurements verify the cross section magnitudes of previously reported measurements and assure the internal consistency of the present elastic and inelastic neutron scattering studies. An optical-statistical model is deduced from the experimental foundation. It provides for a quantitative interpretation of the measured values and particularly suggests that the spin and parity of the 1.190 MeV state is 9/2- and that those of the 1.460 and 1.481 states are 7/2- or 9/2- and 5/2- or 7/2, respectively. These suggested assignments tend to remove previous ambiguities in the understanding of the low lying excited structure of cobalt and are consistent with a nuclear-structure model based upon single-particle and collective concepts. The experimental and calculational results, together with previously available information, are utilized to provide a comprehensive evaluated nuclear data file in the ENDF format covering the energy range

0.1 to 20.0 MeV. Extension to essentially thermal energy is carried out by explicit inclusion of the ENDF, MAT-1118 evaluated file for energies of less than 0.1 MeV. The complete composite file is presented in numerical form.

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TABLE 1. Energies, spins and parities of states of ^{59}Co .

No.	E_x (MeV) ^a	Select J^π	Alternate J^π	Exp. E_x (MeV) ^b
1	0	7/2-	----	----
2	1.099	3/2-	----	1.10 ± 0.01
3	1.190	9/2-	5/2-	1.20 ± 0.01
4	1.291	3/2-	----	1.30 ± 0.01
5	1.434	1/2-	----	$(1.43 \pm 0.01)^c$
6	1.460	7/2-	9/2-	1.46 ± 0.02
7	1.481	5/2-	----	
8	1.744	7/2-	----	1.72 ± 0.02
9	2.061	(5/2-) ^d	7/2-	2.06 ± 0.02
10	2.087	(9/2-)	----	2.09 ± 0.02
11	2.153	(5/2-)	----	
12	2.183	(7/2-)	----	2.16 ± 0.03
13	2.206	(5/2-)	----	
14	2.397	(9/2-)	----	2.35 ± 0.05
15	2.479	(5/2-)	----	
16	2.541	(7/2-)	----	2.50 ± 0.05
17	2.585	(5/2-)	----	
18	2.712	(11/2-)	----	----
19	2.720	(1/2+)	----	----

a. Energies from Ref. 1 .

b. Experimental uncertainties pertain to mean excitation energies in MeV and do not necessarily reflect experimental resolution.

c. Corresponding cross sections are uncertain.

d. Bracketed J^π values are estimates based upon values of Ref. 1 and, in the absence of any information, are speculative estimates.

e. Where not otherwise specified "select" and "alternate" sequences are identical.

TABLE 2. Processes, Q-Values and Thresholds Considered in this Evaluation.

<u>NO.</u>	<u>Process</u>	<u>Q-Value(MeV)</u>	<u>Threshold(MeV)</u>
1.	$\sigma(n)$ (Total)	--	--
2.	$\sigma(n;n')$		
a.	Elastic	0.0	--
b.	$(n;n'_1)$	-1.099	1.117
c.	$(n;n'_2)$	-1.190	1.210
d.	$(n;n'_3)$	-1.291	1.313
e.	$(n;n'_4)$	-1.460	1.484
f.	$(n;n'_5)$	-1.744	1.773
g.	$(n;n'_6)$	-2.070	2.105
h.	$(n;n'_7)$	-2.160	2.196
i.	$(n;n'_8)$	-2.350	2.390
j.	$(n;n'_9)$	-2.500	2.542
k.	Continuum	-2.400	2.440
3.	$\sigma(n;\gamma)$	--	--
4.	$\sigma(n;2n')$	-10.461	10.637
5.	$\sigma(n;3n')$	-19.033	19.354
6.	$\sigma(n;p)$	-0.783	0.796
7.	$\sigma(n;n',p)$	-7.370	7.495
8.	$\sigma(n;\alpha)$	+0.320	--
9.	$\sigma(n;n',\alpha)$	-6.951	7.068
10.	$\sigma(n;d)$	-5.145	5.232
11.	$\sigma(n;t)$	-8.930	9.081
12.	$\sigma(n;{}^3He)$	-11.476	11.669
13.	$\sigma(n;2p)$	-12.682	12.896

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FIGURE CAPTIONS

- Fig. 1. Total neutron cross sections of cobalt. The present results are indicated by O. The results of Cierjacks et al. (15) are represented by solid curve. Other illustrated results are: |||| = Foster and Glasgow (39), Δ = Walt et al. (45) and X = Nereson and Darden (43).
- Fig. 2. Elastic neutron scattering cross sections of cobalt. Results at energies > 1.5 MeV are from the present measurements; those at energies < 1.5 MeV were previously reported from this laboratory (2). Measured values are indicated by datum points and curves illustrate the results of least-square fits of a legendre expansion to the experimental values as described in the text.
- Fig. 3. Comparison of measured differential elastic scattering cross sections (datum points) and results obtained from optical model calculations (curves). CE and SE refer, respectively, to compound-elastic and shape-elastic scattering. The data points are referenced as follows: O ($E > 1.5$ MeV) = present work, O ($E \leq 1.5$) = Ref. 2, \triangleleft = Ref. 3, + = Ref. 103, X = Ref. 5, \leftarrow = Ref. 7, \triangleright = Ref. 6 and X = Ref. 4. Approximate incident energies are given with further definition when a data set differs appreciably from the mean. At lower incident energies distributions within an interval of ≈ 0.1 MeV are plotted in an effort to average known energy-dependent fluctuations.
- Fig. 4. Inelastic neutron scattering cross sections of cobalt. Data points indicate measured values referenced as follows: \square ($E > 1.5$ MeV) = This Work, \square ($E \leq 1.5$ MeV) = Ref. 2, X = Ref. 4, + = Ref. 9, O = Ref. 10, Δ = Ref. 11, and \diamond = Ref. 12. Excitation energies are indicated in MeV. The heavy solid curve is an "eye-guide" based upon measured values and is used in this evaluation. The dashed curve indicates the results of calculations based upon the "selected" level structure of Table 1 and the dotted curve those obtained with the "alternate" structure of Table 1 (see text for discussion).
- Fig. 5. Comparison of measured and calculated total neutron cross sections of cobalt. The solid curve indicates high resolution experimental results from Ref. 13 (0.1 - 0.12 MeV), Ref. 14 (0.12 - 0.21 MeV)

and Ref. 15 (0.37 - 20.0 MeV). Lesser resolution individual data points are referenced as follows: \square = Ref. 38, X = Ref. 40, \diamond = Ref. 44, $+$ = Ref. 42, O = Ref. 45, $|||$ = Ref. 39, and $*$ = Ref. 43. The heavy dashed curve indicates the results of optical model calculations as described in the text.

- Fig. 6. Comparison of the structure model with reported experimental values as defined in Ref. 1. The respective band structure, band constants (A) and decoupling parameters (a) are indicated together with the equation defining the excitation energies (31).
- Fig. 7. Comparison of statistical R-Matrix calculation with experimental measurements. The upper curve was obtained by statistical calculation at 0.1 keV intervals. This result was averaged over a "resolution function" of 0.8 keV to obtain the center curve. The lower curve is the experimental result taken from Ref. 15.
- Fig. 8. Comparison of the present evaluated total cross section of cobalt (light solid line) with that given in ENDF, MAT-1118 (heavy solid curve above 0.2 MeV, dashed curve at lower energies).
- Fig. 9. Elastic scattering angular distributions used in the present evaluation.
- Fig. 10. Comparison of present evaluated elastic scattering, total inelastic scattering and ($n;2n$) cross sections (light curves) with those given in ENDF, MAT-1118 (heavy curves).
- Fig. 11. Discrete, continuum and total inelastic scattering cross sections employed in the present evaluation.
- Fig. 12. Comparison of the evaluated discrete inelastic cross sections of the present work (A) with those given in ENDF, MAT-1118 (B).
- Fig. 13. Summary of partial reaction cross sections utilized in the present evaluation.
- Fig. 14. Inelastic neutron scattering "temperatures". Data points are referenced as follows: O = Ref. 53, \diamond = Ref. 4, and \square = Ref. 54. The present evaluated result is indicated by the solid curve.
- Fig. 15. Radiative capture cross sections of cobalt. Data points are referenced as follows: O = Ref. 56, X = Ref. 55 and Δ = 57. The present evaluation is indicated by the heavy solid curve, that of ENDF, MAT-1118, by the light curve.
- Fig. 16. Measured and evaluated ($n;2n$) cross sections of cobalt. Solid curve indicates the present evaluation, the dashed curve that of

ENDF, MAT-1118. Data points are referenced as follows: O = Ref. 59, Δ = Ref. 60, + = Ref. 61, X = Ref. 62, Z = Ref. 63, \sqcup = Ref. 64, V = Ref. 65, % = Ref. 66, \diamond = Ref. 67, \dagger = Ref. 68, \square = Ref. 69, X = Ref. 70, Y = Ref. 71, * = Ref. 72, and \star = Ref. 73.

Fig.17. Measured and evaluated (n;p) cross sections of cobalt. Solid curve indicates the present evaluation, dashed curve that of ENDF, MAT-1118. Data points are referenced as follows: O = Ref. 80, Δ = Ref. 75, X = Ref. 77, \diamond = Ref. 73, \dagger = Ref. 69, X = Ref. 81, Z = Ref. 78, Y = Ref. 86, and \square = Ref. 79.

Fig.18. Measured and evaluated (n; α) cross sections of cobalt. The present (solid curve) and ENDF, MAT-1118 (dashed curve) evaluations are indicated. Data points are referenced as follows: O = Ref. 87, Δ = Ref. 88, \diamond = Ref. 73, \dagger = Ref. 68, Y = Ref. 89, \square = Ref. 69, * = Ref. 65, + = Ref. 91, X = Ref. 92, X = Ref. 93, Z = Ref. 94, and \star = Ref. 90.

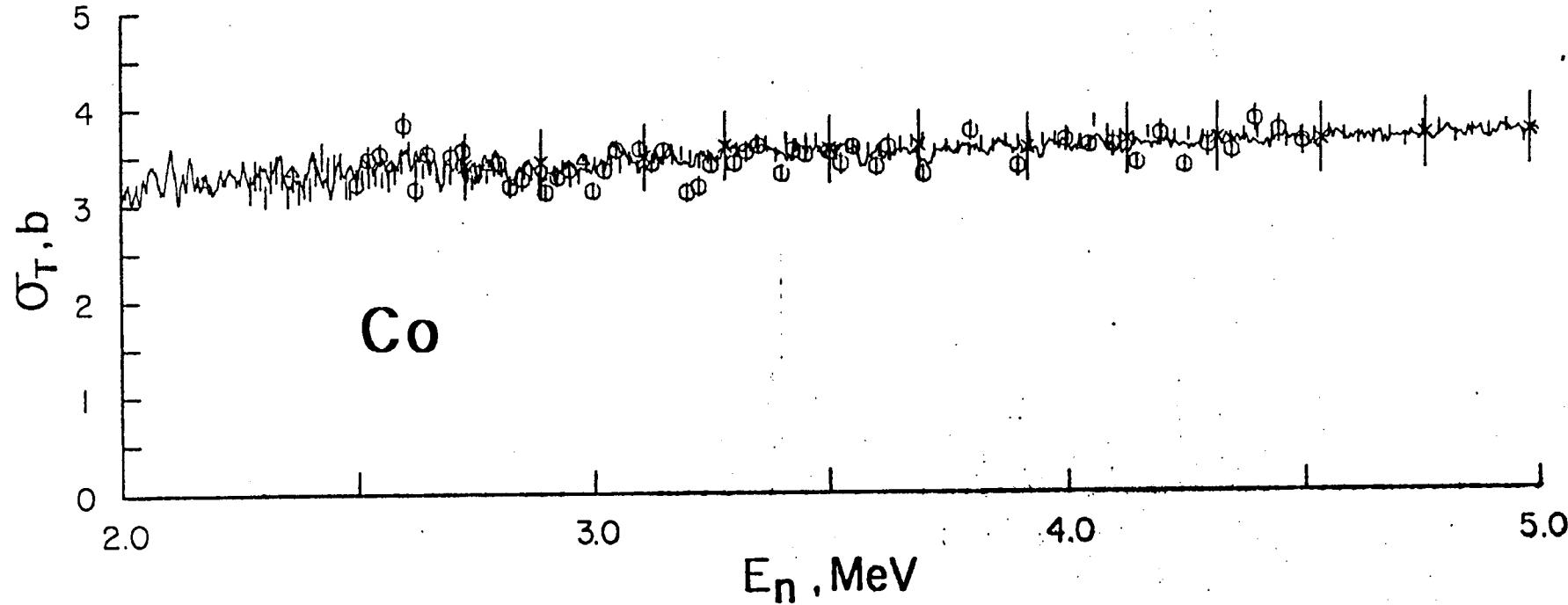


Fig. 2

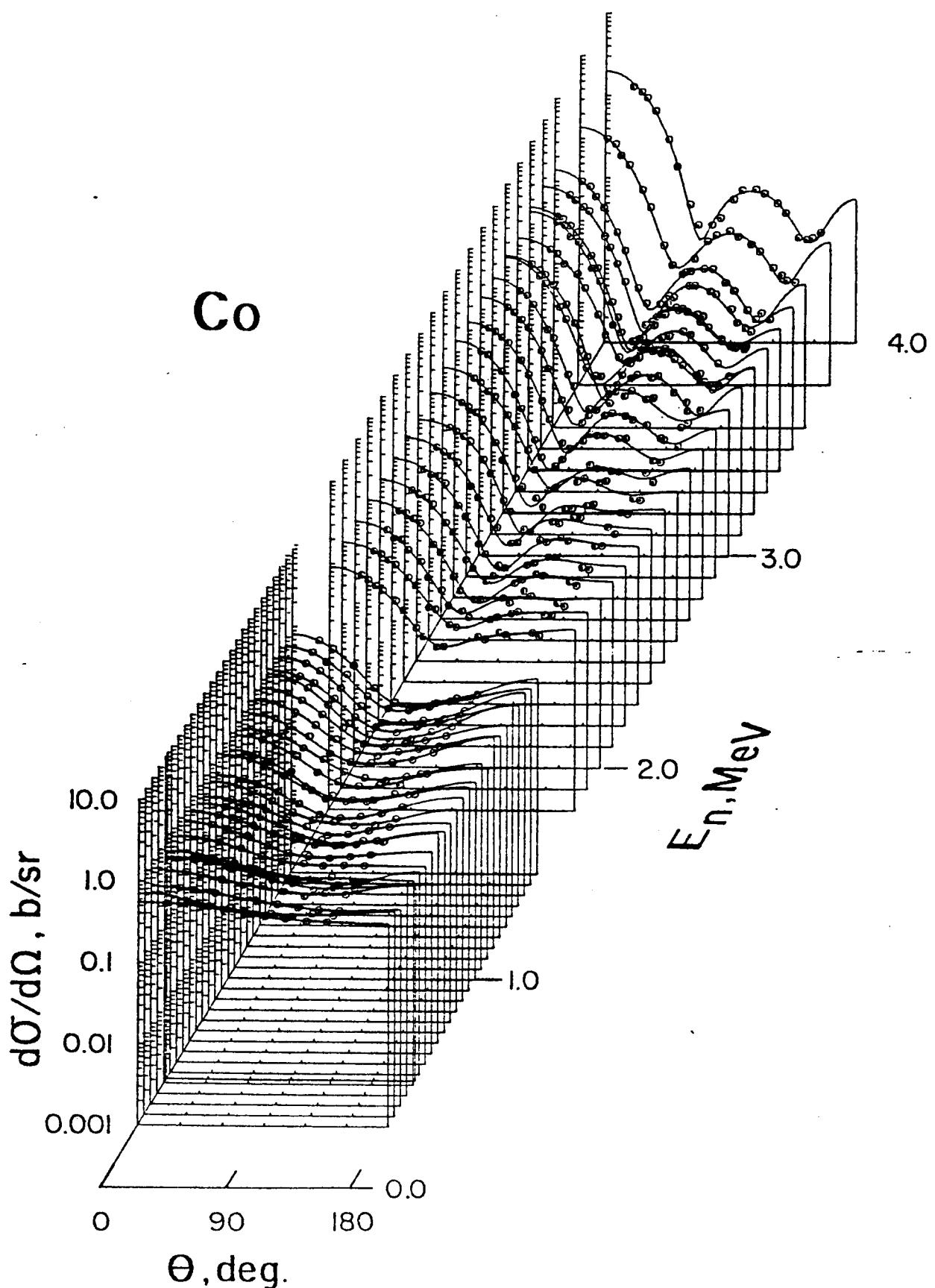


Fig. 3

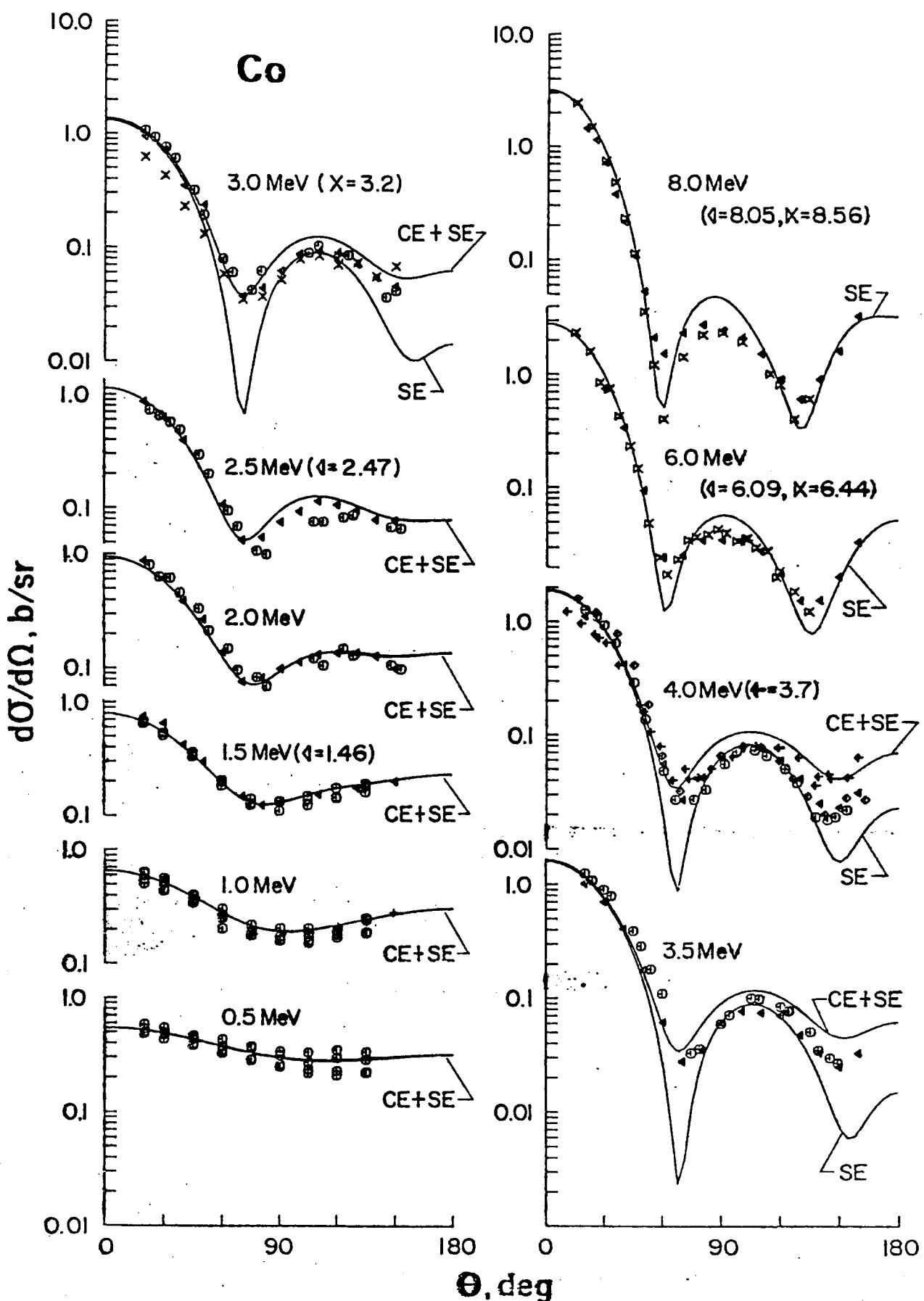
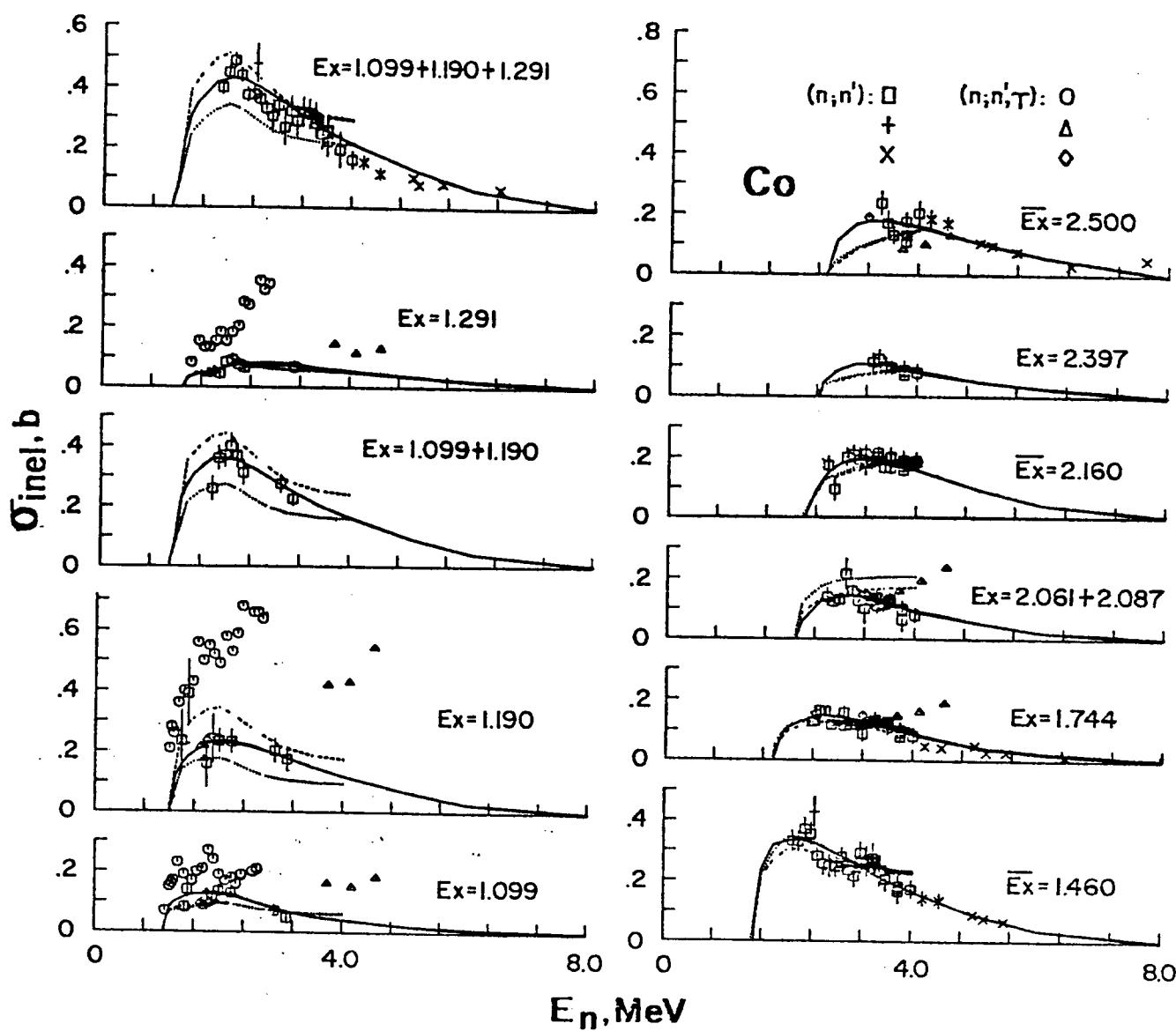


Fig. 4



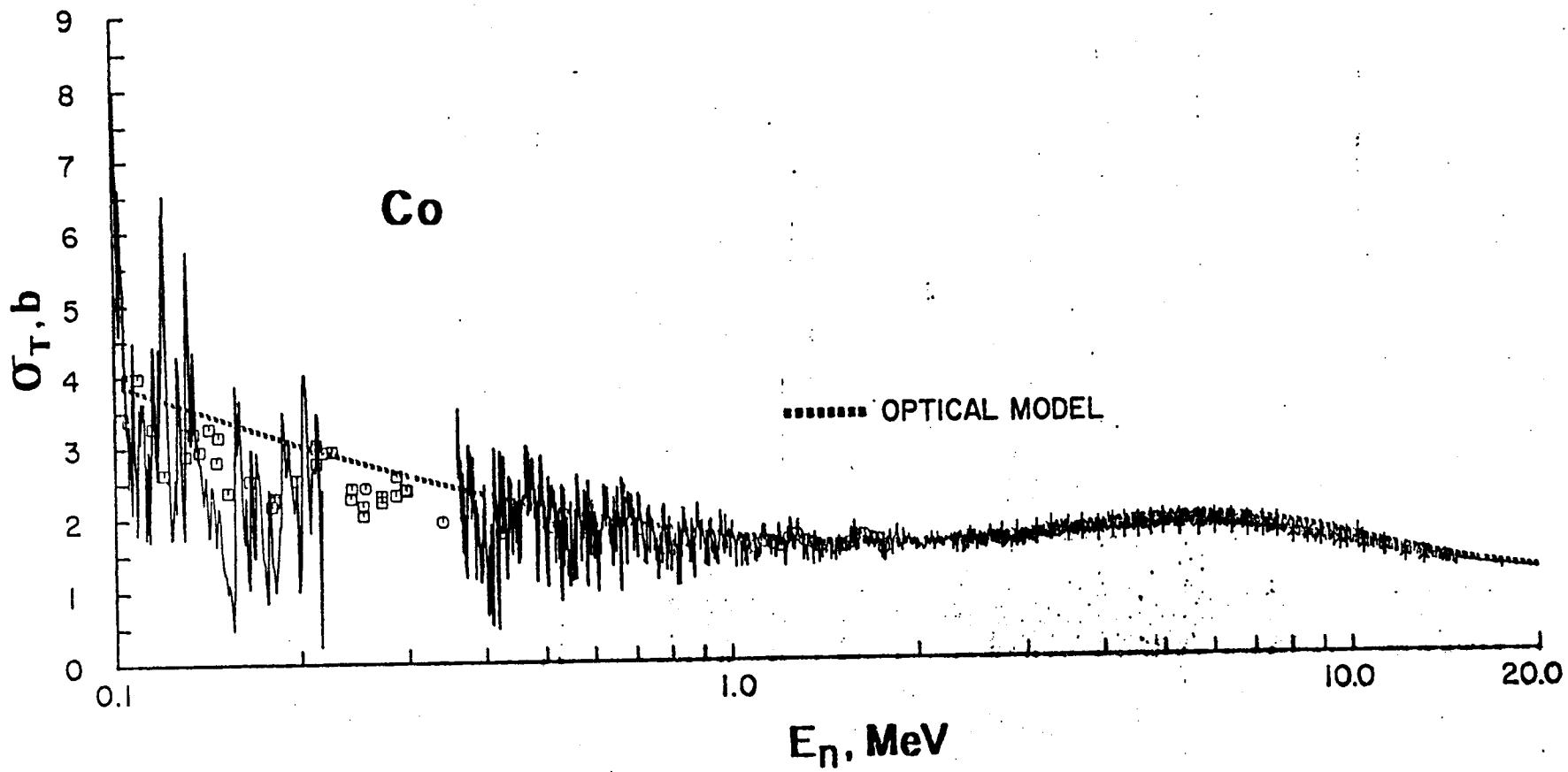
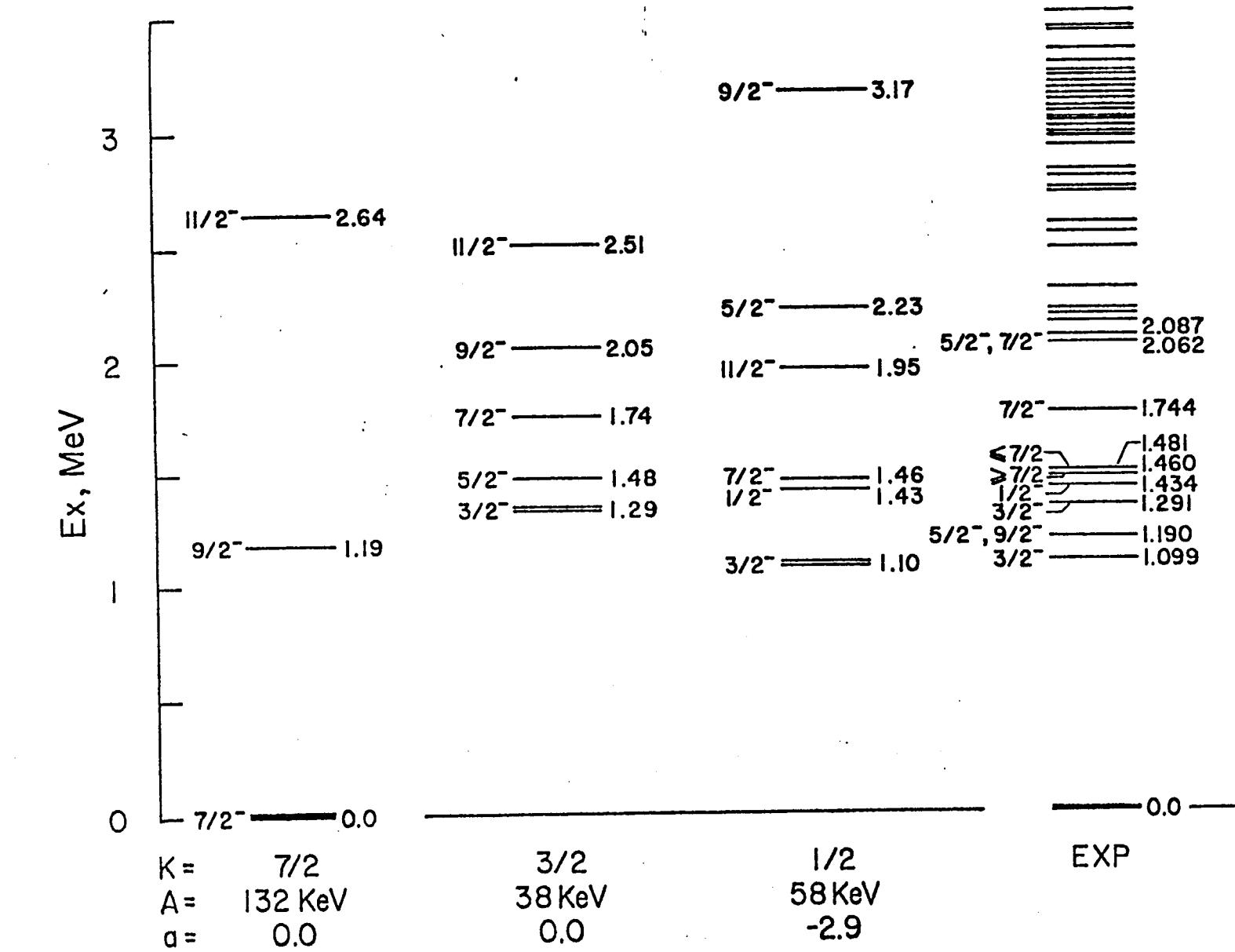


Fig. 5



$$E(J) = A [J(J+1) + a(-1)^{J+1/2} (J+1/2)]$$

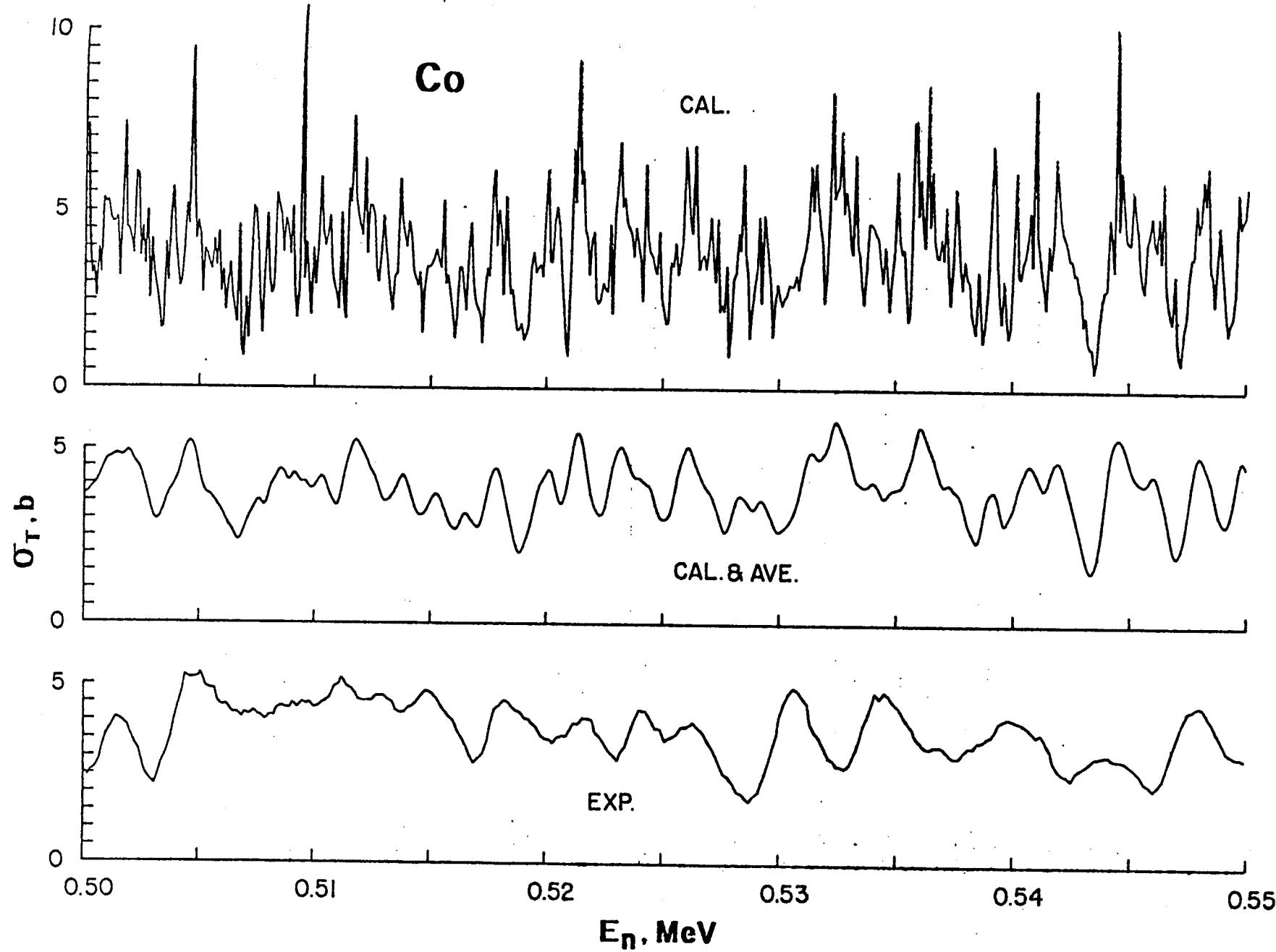


FIG. 7

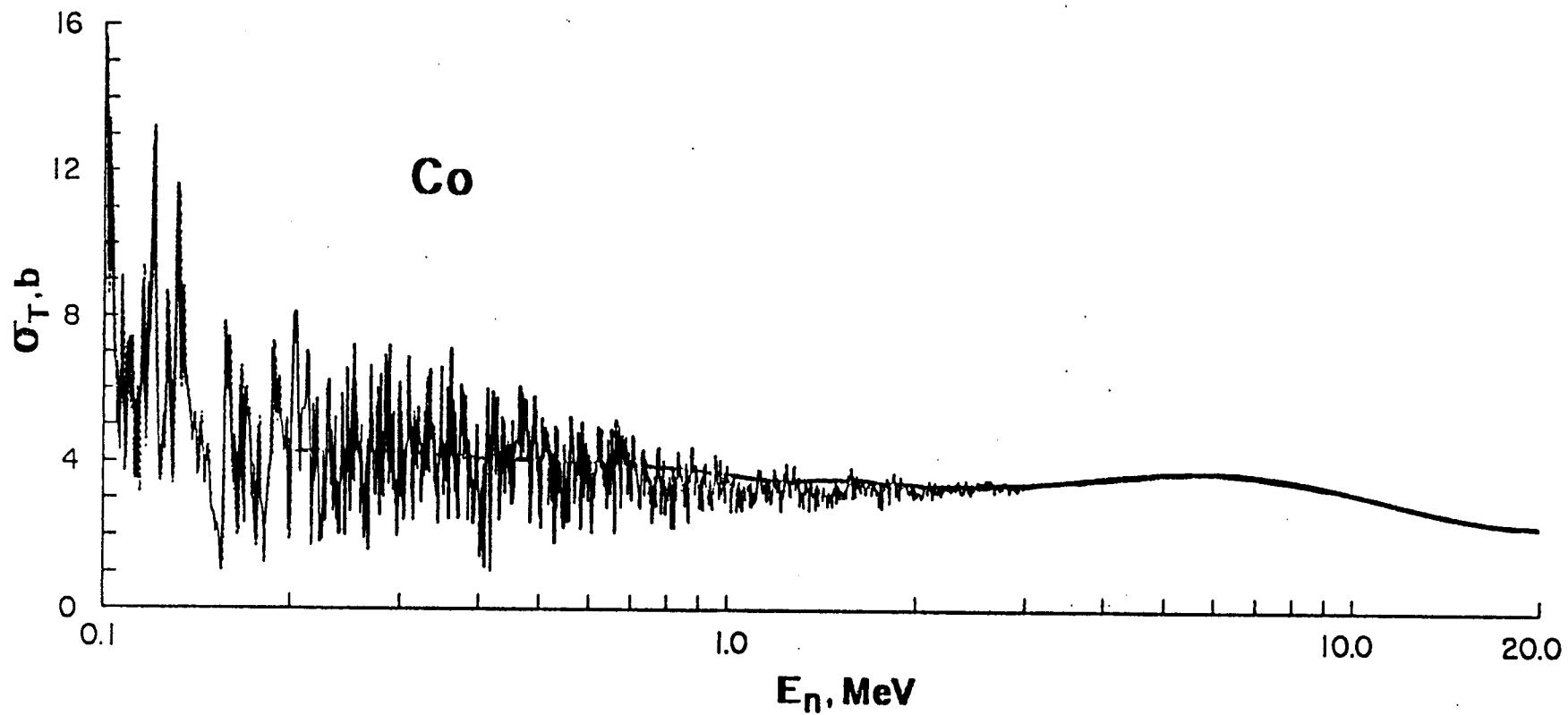


Fig. 8

Fig. 9

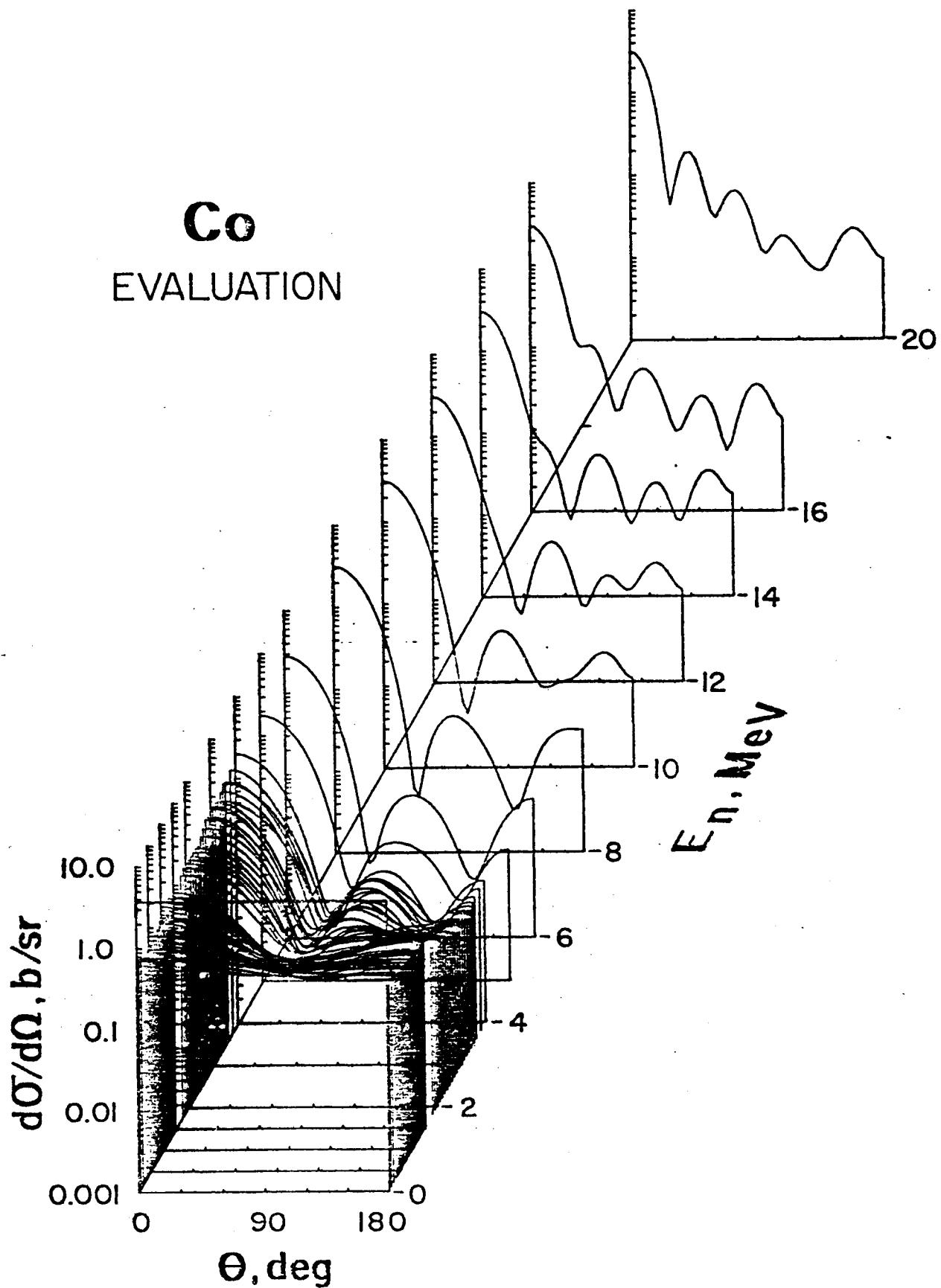
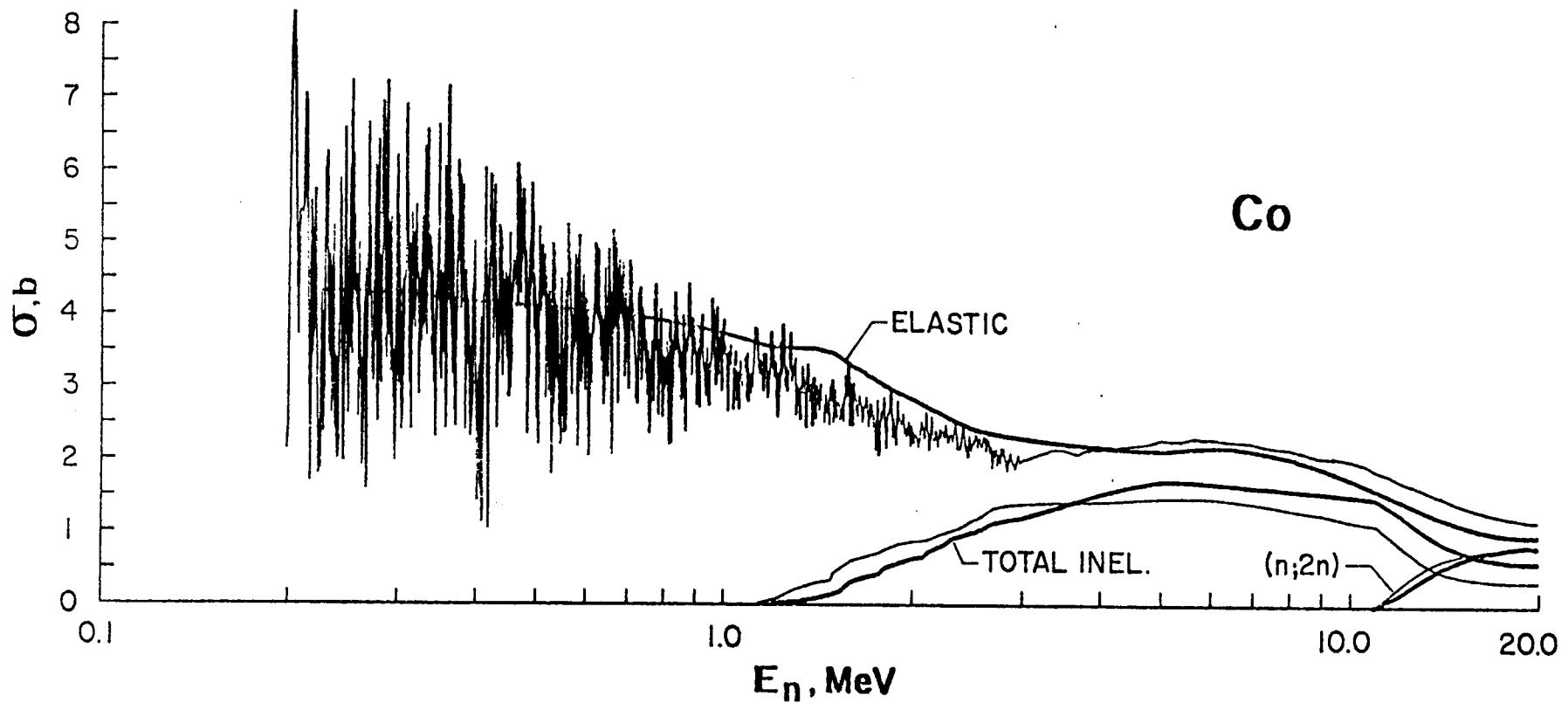


Fig. 10



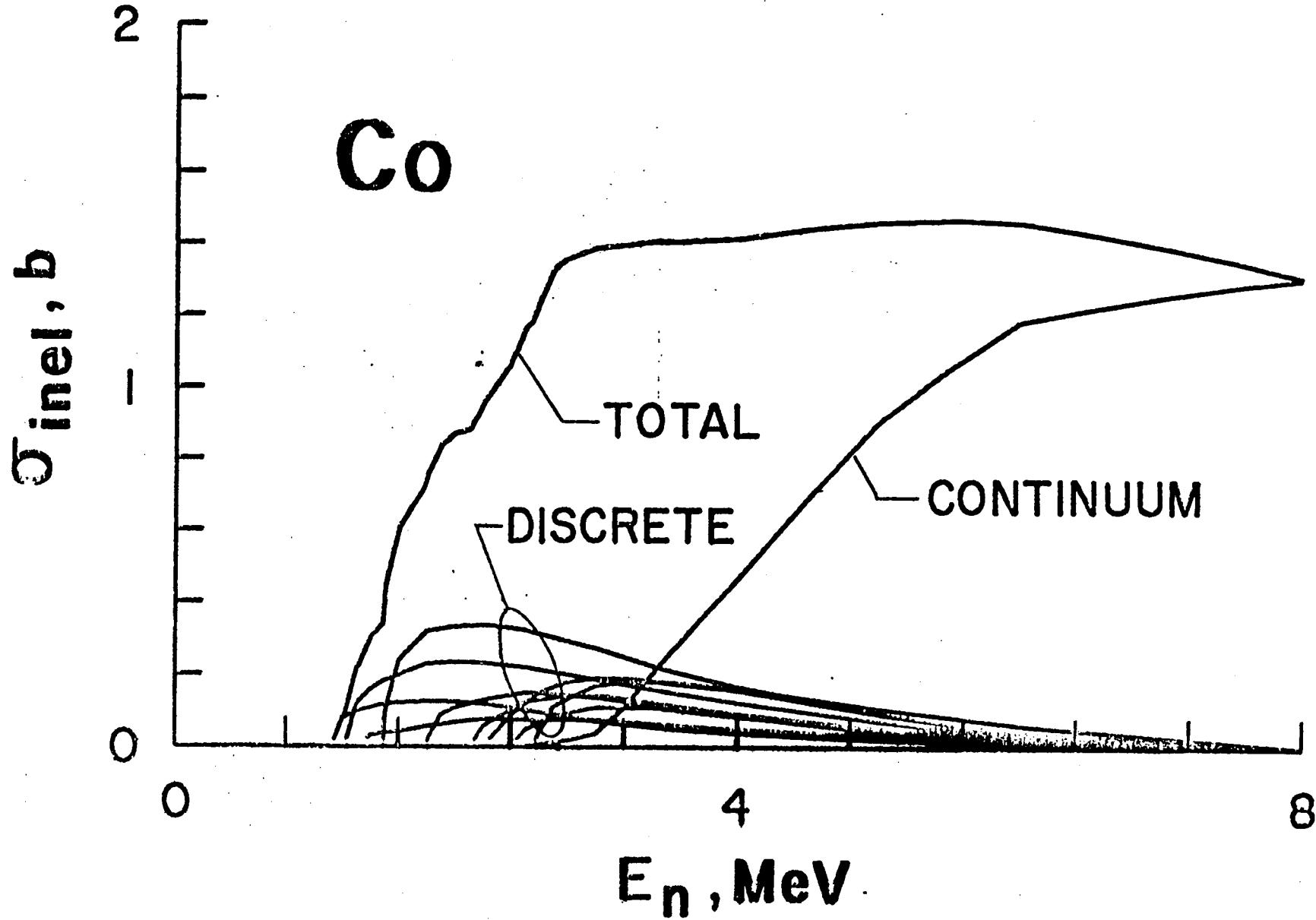
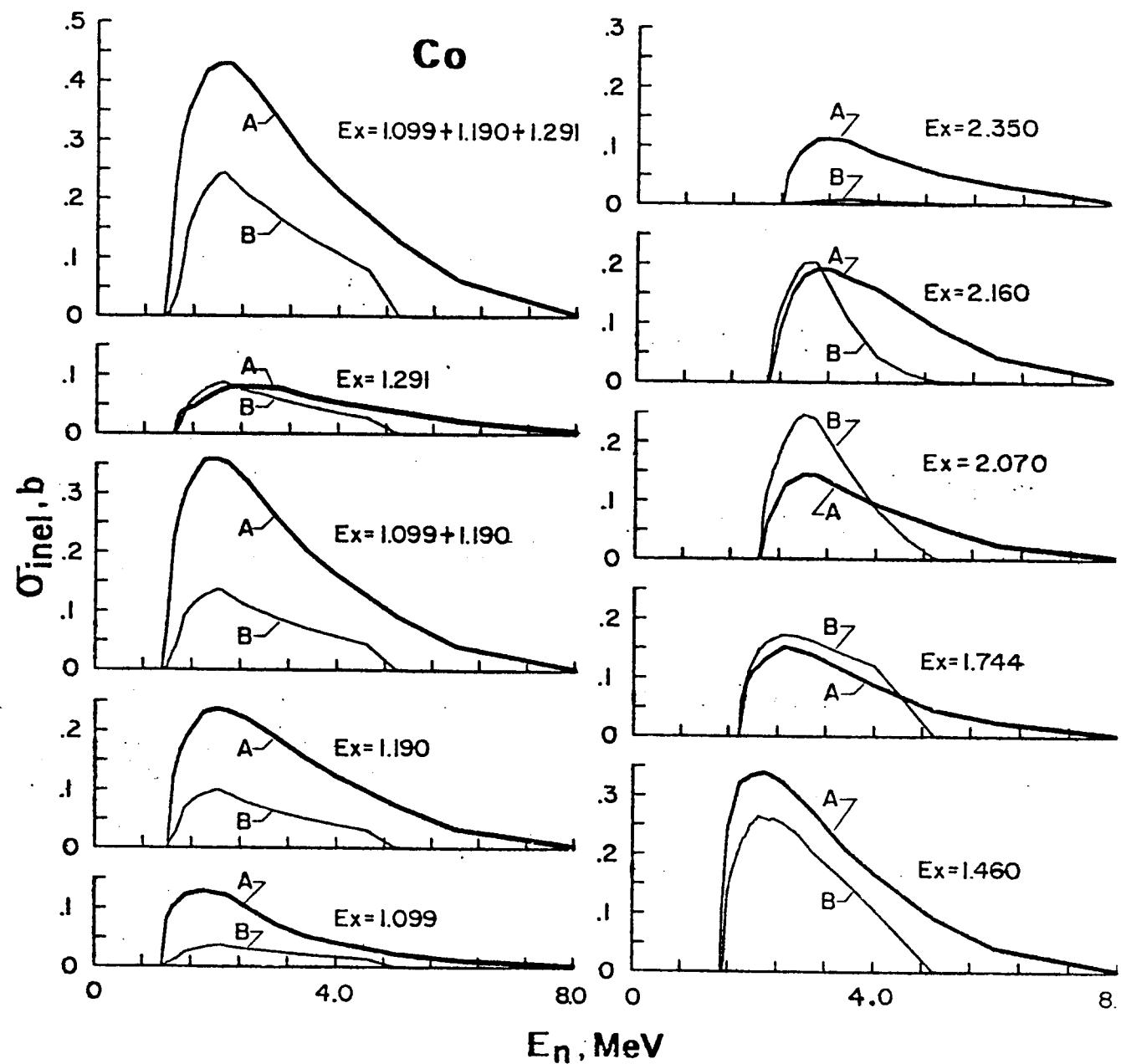


FIG. II

Fig. 12



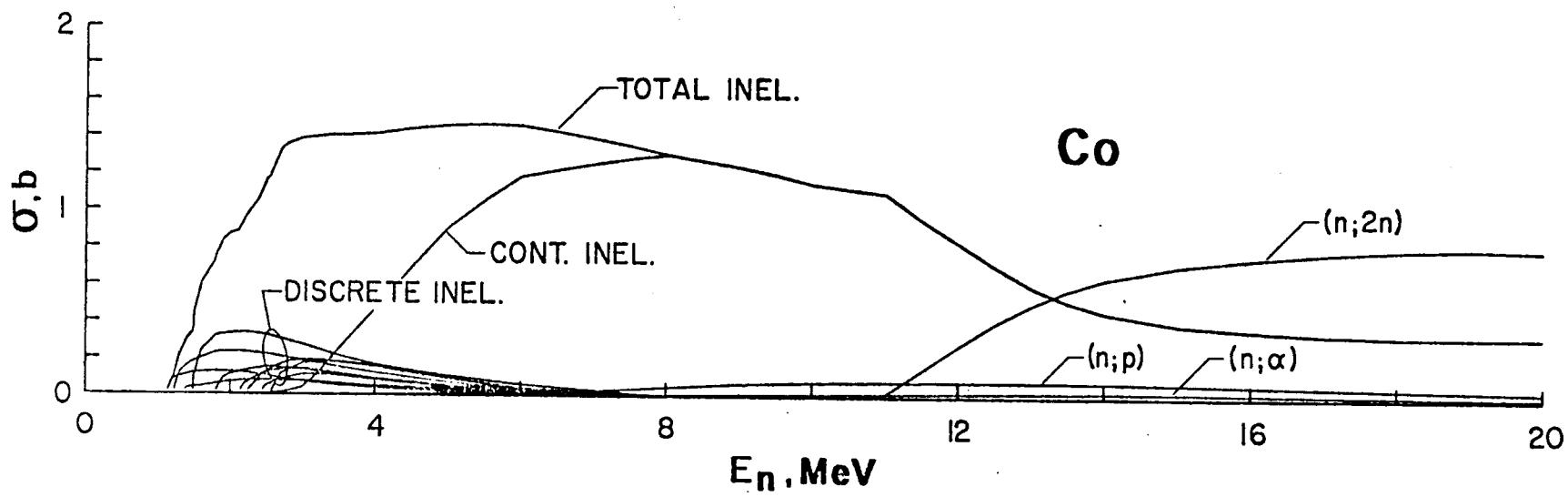


Fig. 13

Fig. 14

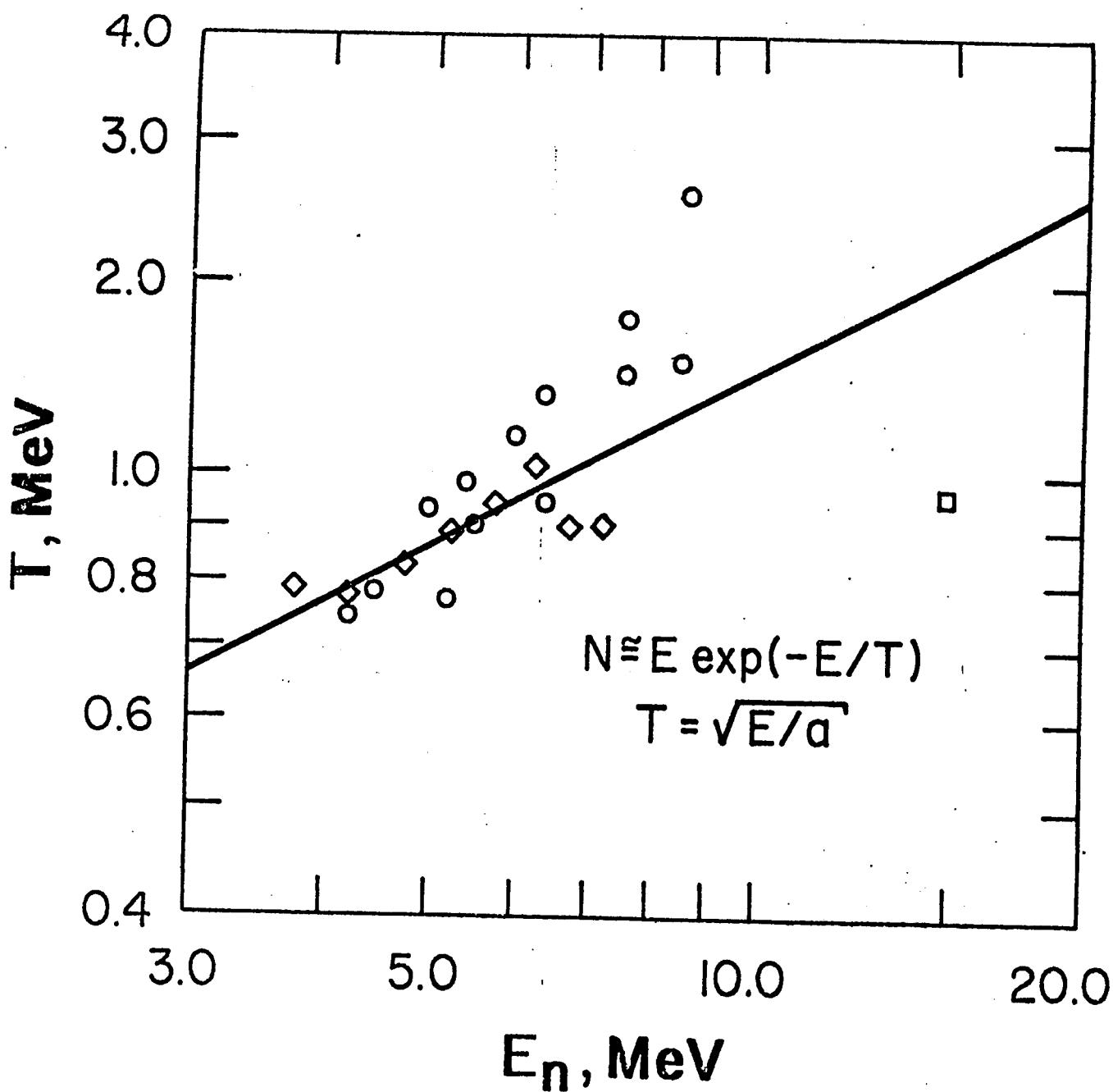


FIG. 15

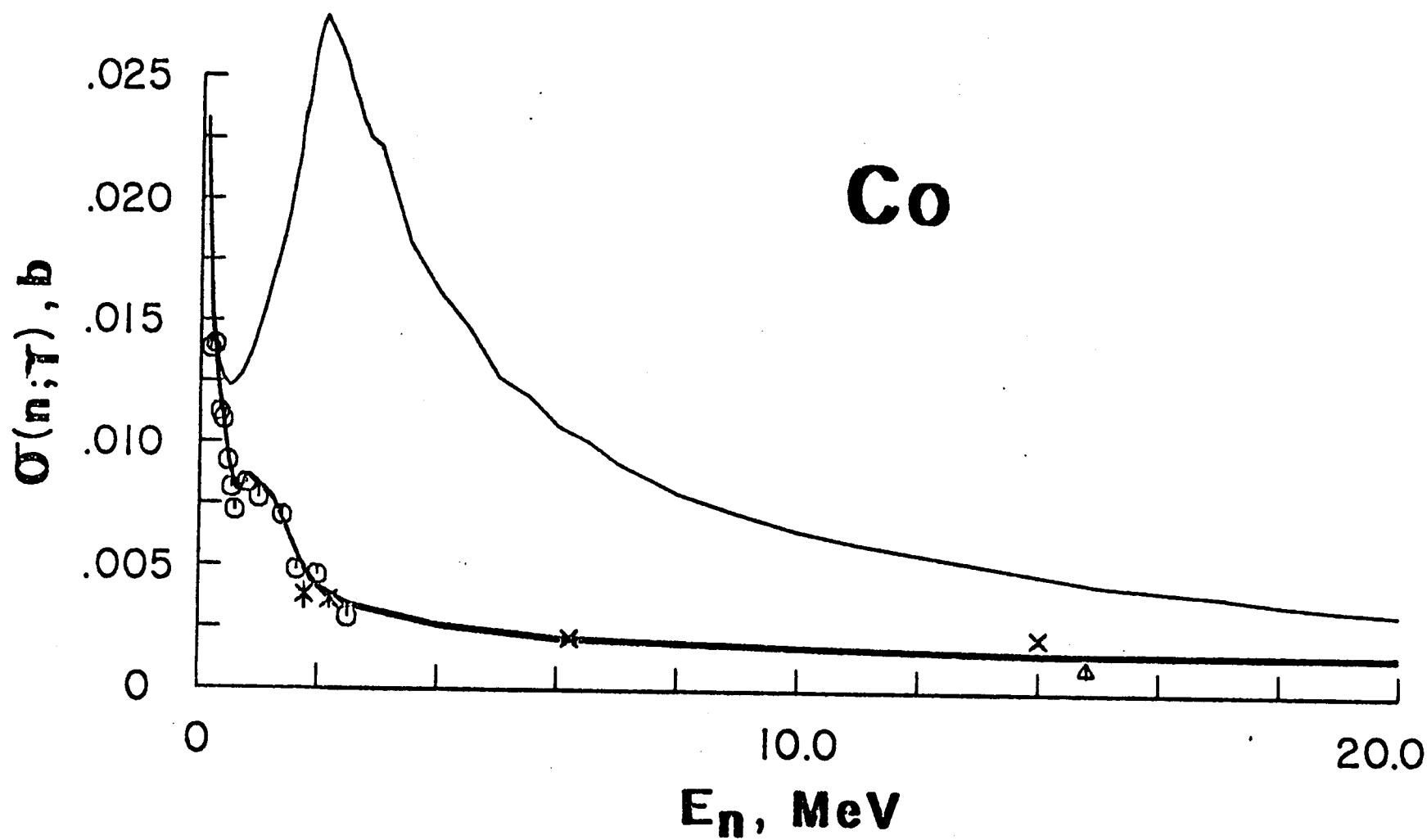
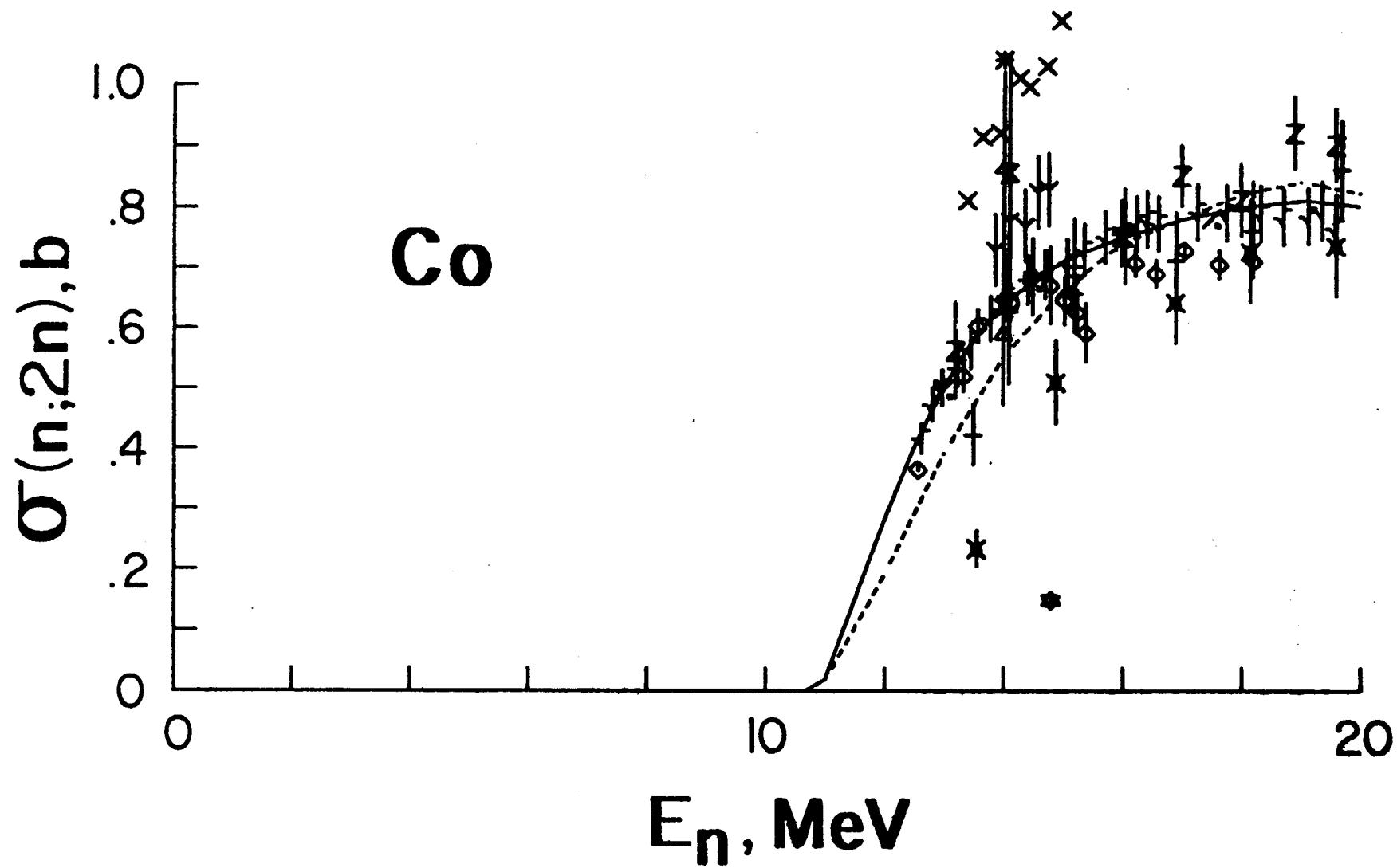


Fig. 16



$\sigma(n;p), b$

-99-

Co

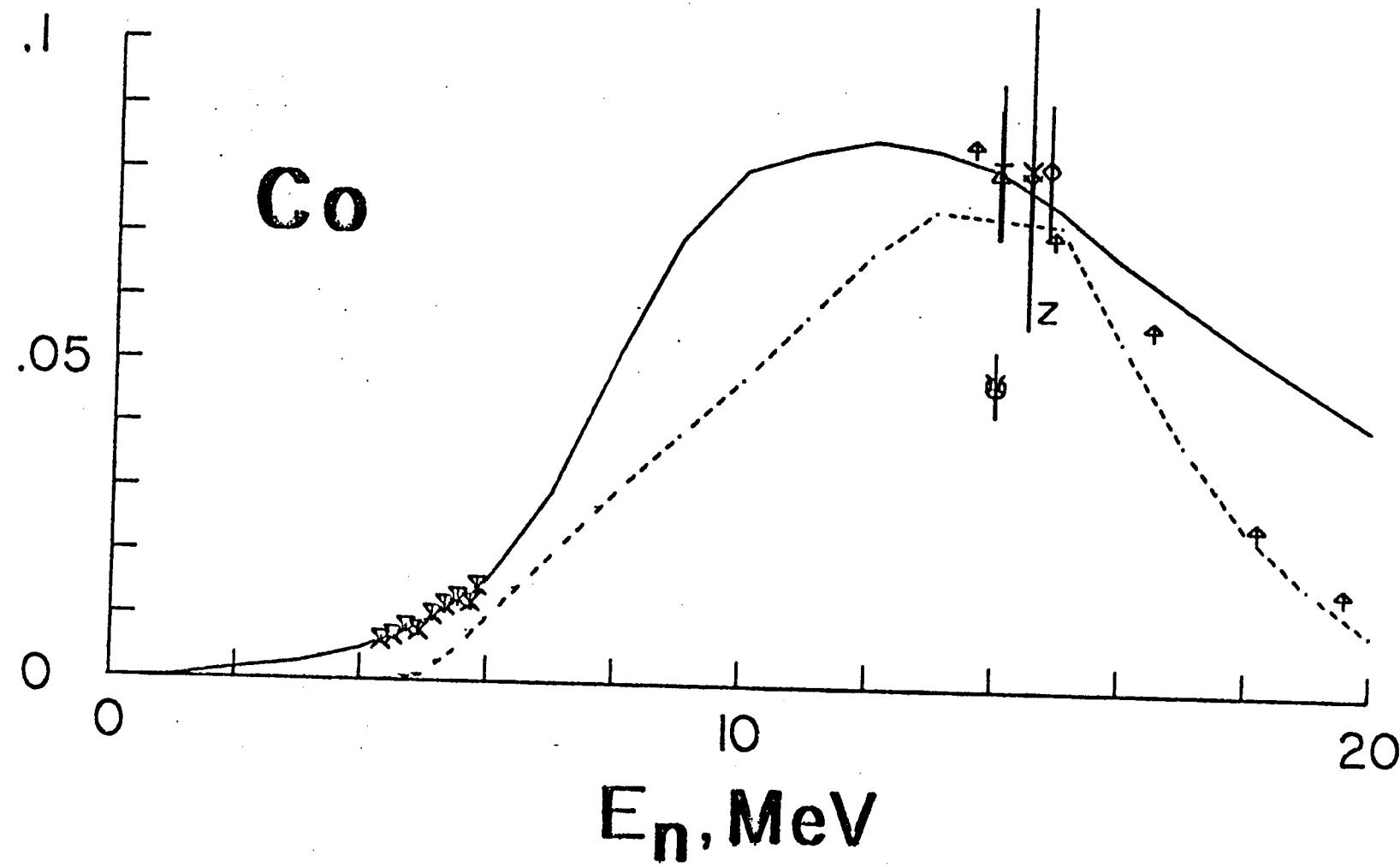
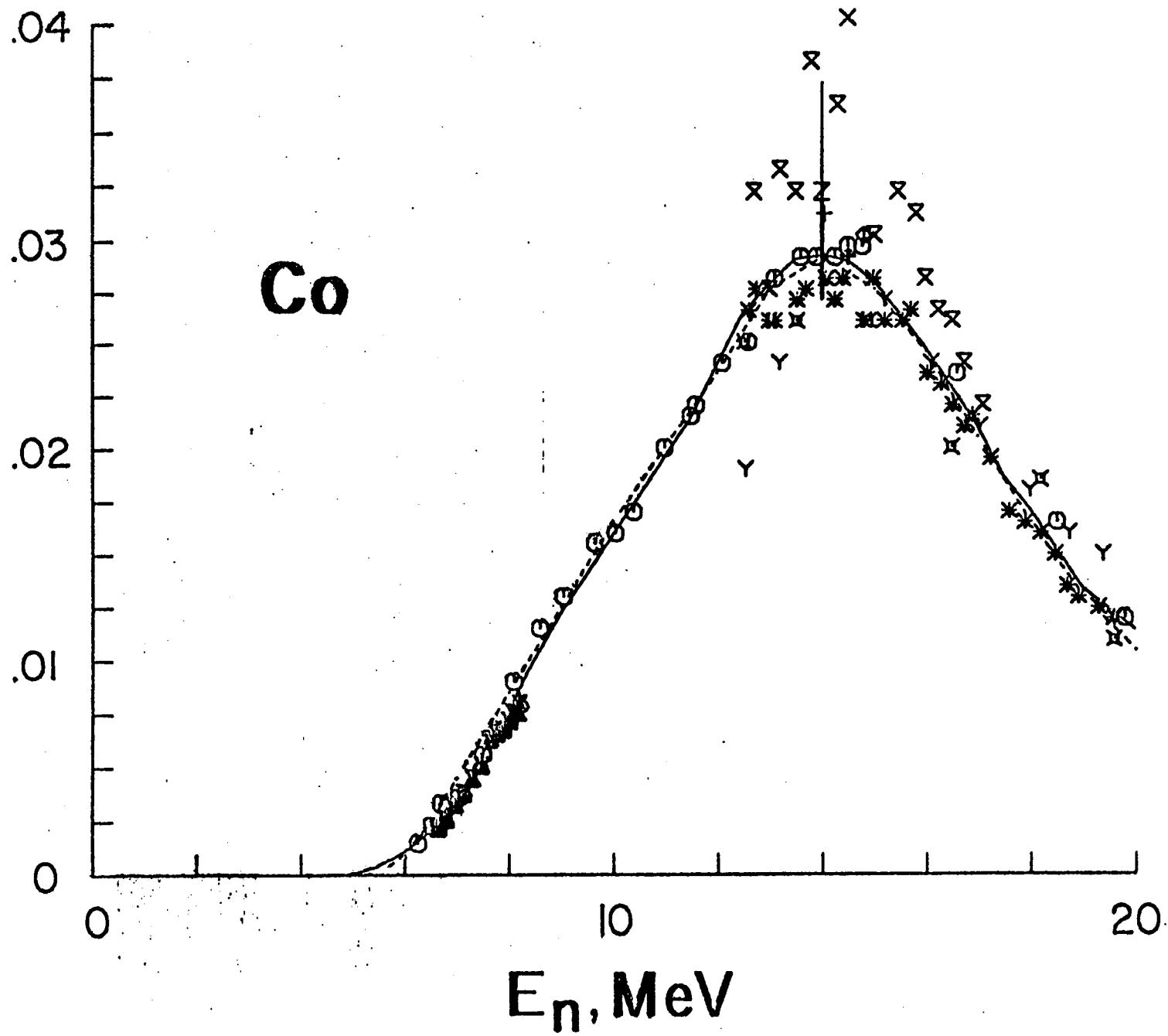


Fig. 17

$\sigma(n;\alpha), b$



"APPENDIX, EVALUATED DATA FILE IN ENDF/B FORMAT"

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0.00000+ 0	0.00001+ 0	1	0	07	09999	1451
***** C.-59 *****						
EVALUATION BY A.G. AND D.L. SMITH---ANL---JUNE 1973.						
ABOVE 100 KEV ENTIRELY NEW DATA						
DOCUMENTATION TO BE PROVIDED						
BELOW 100 KEV DATA IS EXPLICITLY TAKEN FROM THE EVALUATION						
OF T. STEPHENSEN AND A. PRINCE AS GIVEN IN MAT-1112						

1	451	51			9999	1451
1	453	11			9999	1451
2	151	48			9999	1451
3	1	749			9999	1451
3	2	747			9999	1451
3	4	23			9999	1451
3	16	8			9999	1451
3	51	8			9999	1451
3	52	8			9999	1451
3	53	8			9999	1451
3	54	8			9999	1451
3	55	7			9999	1451
3	56	7			9999	1451
3	57	7			9999	1451
3	58	7			9999	1451
3	59	7			9999	1451
3	91	16			9999	1451
3	102	150			9999	1451
3	103	9			9999	1451
3	104	5			9999	1451
3	105	5			9999	1451
3	107	23			9999	1451
3	251	23			9999	1451
3	252	23			9999	1451
3	253	23			9999	1451
4	2	193			9999	1451
4	16	10			9999	1451
4	51	10			9999	1451
4	52	10			9999	1451
4	53	10			9999	1451
4	54	10			9999	1451
4	55	10			9999	1451
4	56	10			9999	1451
4	57	10			9999	1451
4	58	10			9999	1451
4	59	10			9999	1451
4	91	10			9999	1451
5	15	7			9999	1451
5	91	11			9999	1451
					9999	1 0
2.70590+ 4	5.34269+ 1	1	0	1	09999	1453
2.70590+ 4	5.34269+ 1	0	0	2	49999	1453
1.00000- 7	2.00000+ 7				9999	1453
0.00000+ 0-1.00000+ 7		0	0	5	09999	1453
1.00000+ 1	2.70590+ 4	1.12990- 7	1.00000+ 0	1.00000+ 0	9999	1453
0.00000+ 0-7.00000+ 6		0	0	5	09999	1453
1.00000+ 2	2.70590+ 4	4.25340- 9	1.00000+ 0	1.00000+ 0	9999	1453
0.00000+ 0-7.00000+ 5		0	0	5	09999	1453
1.00000+ 2	2.70590+ 4	1.70250- 7	1.00000+ 0	1.00000+ 0	9999	1453
0.00000+ 0-5.17164+ 1		0	0	5	09999	1453

1.37000+	2	2.51560+	4	7.51790-	5	1.00000+	0	1.00000+	0	9999	1453	
										9999	1 0	
										9999	0 0	
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1.00000-	5	3.60000+	4		1		2		0	09999	2151	
3.50000+	3	6.30000-	1		0		0		2	09999	2151	
5.34269+	1	0.00000+	0		0		0		222	379999	2151	
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-1.00000+	0	4.00000+	0	4.00002-	1	1.54300-	5	4.00000-	1	0.00000+	09999	2151
1.32000+	2	4.00000+	0	5.54000+	0	5.13300+	0	4.50000-	1	0.00000+	09999	2151
4.32200+	3	4.00000+	0	1.10500+	2	1.10000+	2	5.00000-	1	0.00000+	09999	2151
5.31500+	3	3.00000+	0	0.90400+	2	6.90000+	2	4.00000-	1	0.00000+	09999	2151
8.65000+	3	3.00000+	0	3.83100+	1	3.80000+	1	3.10000-	1	0.20000+	09999	2151
8.74000+	3	4.00000+	0	1.04000+	0	0.40000-	1	4.00000-	1	0.00000+	09999	2151
9.70000+	3	3.00000+	0	2.70000+	0	2.30000+	0	4.00000-	1	0.00000+	09999	2151
1.07000+	4	4.00000+	0	5.53000+	1	6.50000+	1	6.00000-	1	0.00000+	09999	2151
1.18500+	4	3.00000+	0	3.37000+	0	2.90000+	0	4.00000-	1	0.00000+	09999	2151
1.32800+	4	4.00000+	0	2.00000+	1	2.00000+	1	8.00000-	1	0.00000+	09999	2151
1.56600+	4	3.00000+	0	7.55000+	1	7.50000+	1	5.00000-	1	0.00000+	09999	2151
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1.97500+	4	3.00000+	0	3.30000+	0	2.90000+	0	4.00000-	1	0.00000+	09999	2151
2.20700+	4	3.00000+	0	6.73400+	2	8.70000+	2	4.00000-	1	0.00000+	09999	2151
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2.44200+	4	3.00000+	0	3.40400+	2	3.40000+	2	4.00000-	1	0.00000+	09999	2151
2.52000+	4	4.00000+	0	1.56400+	2	1.50000+	2	4.00000-	1	0.30000+	09999	2151
2.59500+	4	4.00000+	0	2.04000+	1	2.00000+	1	4.00000-	1	0.00000+	09999	2151
2.73500+	4	4.00000+	0	1.45400+	2	1.45000+	2	4.00000-	1	0.00000+	09999	2151
2.94100+	4	4.00000+	0	6.30000+	0	7.90000+	0	4.00000-	1	0.00000+	09999	2151
3.01100+	4	4.00000+	0	2.76400+	2	2.70000+	2	4.00000-	1	0.00000+	09999	2151
3.14400+	4	3.00000+	0	7.04000+	1	7.00000+	1	4.00000-	1	0.00000+	09999	2151
3.18500+	4	3.00000+	0	7.43000+	0	7.00000+	0	4.00000-	1	0.00000+	09999	2151
3.27500+	4	3.00000+	0	1.05400+	2	1.05000+	2	4.00000-	1	0.00000+	09999	2151
3.31000+	4	4.00000+	0	3.34000+	1	3.30000+	1	4.00000-	1	0.00000+	09999	2151
3.49000+	4	4.00000+	0	2.25400+	2	2.25000+	2	4.00000-	1	0.00000+	09999	2151
4.52600+	4	4.00000+	0	1.60400+	2	1.60000+	2	4.00000-	1	0.00000+	09999	2151
4.59800+	4	3.00000+	0	3.12400+	2	3.10000+	2	4.00000-	1	0.00000+	09999	2151
5.15000+	4	4.00000+	0	3.20400+	2	3.20000+	2	4.00000-	1	0.00000+	09999	2151
5.40500+	4	3.00000+	0	4.00400+	2	4.00000+	2	4.00000-	1	0.00000+	09999	2151
7.21000+	4	3.00000+	0	3.90400+	2	3.90000+	2	4.00000-	1	0.00000+	09999	2151
8.87000+	4	3.00000+	0	1.30040+	3	1.30000+	3	4.00000-	1	0.00000+	09999	2151
9.29000+	4	3.00000+	0	1.35040+	3	1.35000+	3	4.00000-	1	0.00000+	09999	2151
9.61000+	4	3.00000+	0	9.50400+	2	9.50000+	2	4.00000-	1	0.00000+	09999	2151
9.88000+	4	4.00000+	0	6.00400+	2	6.00000+	2	4.00000-	1	0.00000+	09999	2151
1.14870+	5	4.00000+	0	1.20040+	3	1.20000+	3	4.00000-	1	0.00000+	09999	2151
5.34269+	1	0.00000+	0		1		0		30	59999	2151	
1.11000+	3	2.00000+	0	4.09260-	1	9.26000-	3	4.00000-	1	0.00000+	09999	2151
2.26400+	3	4.00000+	0	4.09750-	1	9.75000-	3	4.00000-	1	0.00000+	09999	2151
2.56600+	3	3.00000+	0	4.30000-	1	3.00000-	2	4.00000-	1	0.00000+	09999	2151
6.39000+	3	3.00000+	0	2.10000+	0	1.70000+	0	4.00000-	1	0.00000+	09999	2151
1.92000+	4	3.00000+	0	3.30000+	0	2.90000+	0	4.00000-	1	0.00000+	09999	2151
										9999	2 0	
										9999	0 0	
2.70590+	4	5.34269+	1		0		99		0	09999	3 1	
0.30000+	3	0.00000+	0		0		0		3	22379999	3 1	
	7	5	525		3		2237			29999	3 1	
1.00000-	3	6.34269+	0	1.00000-	3	6.34269+	0	1.00000-	2	2.54500-	19999	3 1
2.55000-	2	1.50000-	1	1.00000-	1	5.04756-	2	1.00000+	1	8.04756-	39999	3 1
1.00000+	2	2.34500-	3	3.00000+	2	1.46936-	3	3.00000+	2	3.30000-	19999	3 1
4.00000+	2	4.00000-	1	5.00000+	2	7.00000-	1	7.00000+	2	7.00000-	19999	3 1

8.00000+	2	6.75000-	1	9.00000+	2	6.50000-	1	1.20000+	3	5.50000-	19999	3	1	120
1.00000+	3	5.50000-	1	1.70000+	3	5.00000-	1	1.80000+	3	5.00000-	19999	3	1	121
1.90000+	3	4.75000-	1	2.00000+	3	4.75000-	1	2.10000+	3	4.20000-	19999	3	1	122
2.20000+	3	4.00000-	1	2.30100+	3	3.75000-	1	2.35000+	3	3.50000-	19999	3	1	123
2.40000+	3	3.40000-	1	2.45000+	3	3.20000-	1	2.50000+	3	3.10000-	19999	3	1	124
2.55000+	3	2.40000-	1	2.60000+	3	2.65000-	1	2.65000+	3	2.20000-	19999	3	1	125
2.70000+	3	1.50000-	1	2.75000+	3	1.20000-	1	2.50000+	3	1.70000-	19999	3	1	126
2.86000+	3	0.60000+	0	1.75000+	4	0.00000+	0	1.77000+	4	3.00000-	19999	3	1	127
1.78000+	4	-5.00000-	1	1.67000+	4	-5.00000-	1	1.59000+	4	-5.00000-	19999	3	1	128
1.40000+	4	-2.20000-	1	1.97000+	4	-2.20000-	1	1.99000+	4	0.00000+	09999	3	1	129
2.40000+	4	-3.50000-	1	2.01000+	4	-4.50000-	1	2.02000+	4	-5.00000-	19999	3	1	130
2.35000+	4	-4.75000-	1	2.04000+	4	-4.50000-	1	2.05000+	4	-4.00000-	19999	3	1	131
2.36000+	4	-4.2.75000-	1	2.07000+	4	-2.00000-	1	2.08000+	4	0.00000+	09999	3	1	132
2.19500+	4	3.00000-	1	2.12000+	4	7.00000-	1	2.13000+	4	1.20000+	09999	3	1	133
2.14000+	4	1.40000+	0	2.15000+	4	3.00000+	0	2.16000+	4	3.00000+	09999	3	1	134
2.17000+	4	5.00000+	0	2.13000+	4	9.00000+	0	2.19000+	4	1.50000+	19999	3	1	135
2.20000+	4	1.50000+	1	2.21000+	4	5.50000+	0	2.22000+	4	2.50000+	09999	3	1	136
2.25000+	4	0.00000+	0	2.29000+	4	0.00000+	0	2.30000+	4	-2.00000+	09999	3	1	137
2.32000+	4	-4.00000+	0	2.34000+	4	-3.70000+	0	2.36000+	4	-2.80000+	09999	3	1	138
2.35000+	4	-4.1.40000+	0	2.40000+	4	-5.00000-	1	2.41000+	4	-4.00000-	19999	3	1	139
2.42000+	4	0.00000+	0	2.50000+	4	0.00000+	0	2.51000+	4	1.40000+	19999	3	1	140
2.52000+	4	1.20000+	1	2.53000+	4	2.00000+	0	2.54000+	4	0.00000+	09999	3	1	141
2.55000+	4	-1.00000+	0	2.56000+	4	-3.00000+	0	2.57000+	4	-3.00000+	09999	3	1	142
2.28000+	4	-4.2.50000+	0	2.59000+	4	-1.00000+	0	2.60000+	4	0.00000+	09999	3	1	143
2.01000+	4	0.00000+	0	2.62000+	4	-2.00000+	0	2.67000+	4	-1.70000+	09999	3	1	144
2.68000+	4	-1.00000+	0	2.69000+	4	-4.00000-	1	2.70000+	4	-2.00000+	19999	3	1	145
2.71000+	4	0.00000+	0	2.76000+	4	0.00000+	0	2.75000+	4	-1.80000+	09999	3	1	146
2.60000+	4	-1.50000+	0	2.86000+	4	-1.50000+	0	2.86000+	4	-1.80000+	09999	3	1	147
2.90000+	4	-4.2.10000+	0	2.92000+	4	-2.00000+	0	2.94000+	4	-1.50000+	09999	3	1	148
2.95000+	4	0.00000+	0	3.20000+	4	0.00000+	0	3.22000+	4	-9.00000-	19999	3	1	149
3.24000+	4	-9.00000-	1	3.25000+	4	1.20000+	0	3.26000+	4	-5.00000-	19999	3	1	150
3.27000+	4	0.00000+	0	3.32000+	4	0.00000+	0	3.34000+	4	-1.40000+	09999	3	1	151
3.36000+	4	-4.1.20000+	0	3.35000+	4	-1.00000+	0	3.40000+	4	-1.10000+	09999	3	1	152
3.44000+	4	-4.1.10000+	0	3.45000+	4	-5.00000-	1	3.47500+	4	0.00000+	09999	3	1	153
3.49900+	4	2.00000-	3	3.50000+	4	5.00000-	3	3.50200+	4	1.20000-	29999	3	1	154
3.50400+	4	1.50000-	2	3.50500+	4	2.12000-	2	3.50800+	4	2.44000-	29999	3	1	155
3.51000+	4	2.71000-	2	3.51200+	4	2.98000-	2	3.51400+	4	3.13000-	29999	3	1	156
3.51500+	4	3.29000-	2	3.51400+	4	3.42000-	2	3.52000+	4	3.55000-	29999	3	1	157
3.52200+	4	3.57000-	2	3.52400+	4	3.75000-	2	3.52600+	4	3.67000-	29999	3	1	158
3.52800+	4	3.95000-	2	3.53000+	4	4.02000-	2	3.53200+	4	4.07000-	29999	3	1	159
3.53400+	4	4.10000-	2	3.53600+	4	-2.56730-	1	3.53800+	4	-5.5300-	19999	3	1	160
3.54000+	4	-6.53100-	1	3.55000+	4	-4.50000-	0	3.57000+	4	-5.15630+	09999	3	1	161
3.58000+	4	-5.55590+	0	3.59000+	4	-5.95570+	0	3.60000+	4	-5.35560+	09999	3	1	162
3.60000+	4	5.54230+	0	3.62000+	4	6.09520+	0	3.64000+	4	7.64500+	09999	3	1	163
3.56000+	4	7.21490+	0	3.67000+	4	7.24480+	0	3.68000+	4	1.03450+	19999	3	1	164
3.68500+	4	1.03450+	1	3.70000+	4	7.34450+	0	3.71000+	4	7.34440+	09999	3	1	165
3.72000+	4	5.74450+	0	3.74000+	4	6.44430+	0	3.76000+	4	6.04380+	09999	3	1	166
3.78000+	4	5.54370+	0	3.80000+	4	5.54350+	0	3.82000+	4	5.34350+	09999	3	1	167
3.84000+	4	5.14330+	0	3.56000+	4	5.04310+	0	3.58000+	4	4.99290+	09999	3	1	168
3.90000+	4	4.94230+	0	3.94000+	4	4.64260+	0	3.96000+	4	4.44240+	09999	3	1	169
3.98000+	4	4.04230+	0	3.99000+	4	3.84220+	0	4.00000+	4	3.44200+	09999	3	1	170
4.01000+	4	2.54190+	0	4.01500+	4	2.84190+	0	4.02000+	4	2.91190+	09999	3	1	171
4.03000+	4	7.05140+	0	4.04000+	4	5.74170+	0	4.05500+	4	4.34150+	09999	3	1	172
4.05000+	4	4.84180+	0	4.07000+	4	4.44150+	0	4.08000+	4	4.36140+	09999	3	1	173
4.10000+	4	3.84120+	0	4.12000+	4	3.19110+	0	4.13500+	4	2.54100+	09999	3	1	174
4.14000+	4	2.54190+	0	4.15750+	4	1.07110+	1	4.16000+	4	1.14100+	19999	3	1	175
4.16250+	4	1.07110+	1	4.17400+	4	7.34070+	0	4.18000+	4	4.74370+	09999	3	1	176
4.15200+	4	4.04120+	0	4.11000+	4	4.21350+	0	4.17500+	4	4.41500+	09999	3	1	177
4.20100+	4	3.04120+	0	4.20000+	4	3.51150+	0	4.24000+	4	3.21520+	09999	3	1	178
4.36000+	4	2.02000+	0	4.27000+	4	2.54100+	0	4.23000+	4	3.16000+	09999	3	1	179

4.29000+	4	3.63990+	0	4.29500+	4	3.53990+	0	4.30000+	4	3.13990+	09999	3	1	180
4.30500+	4	2.73790+	0	4.32000+	4	2.43780+	0	4.34000+	4	1.38990+	09999	3	1	181
4.35000+	4	1.55950+	0	4.37000+	4	2.85970+	0	4.37500+	4	2.85960+	09999	3	1	182
4.35000+	4	2.55950+	0	4.41000+	4	1.65940+	0	4.44000+	4	1.24910+	09999	3	1	183
4.48000+	4	1.35900+	0	4.49500+	4	2.38890+	0	4.50500+	4	3.91850+	09999	3	1	184
4.52000+	4	1.95390+	1	4.52600+	4	2.80390+	1	4.52600+	4	2.81390+	19999	3	1	185
4.55000+	-	3.73520+	0	4.57000+	4	0.40360+	1	4.59900+	4	2.79380+	19999	3	1	186
4.60100+	4	2.00380+	1	4.65000+	4	1.00330+	1	4.68000+	4	6.43780+	09999	3	1	187
4.70000+	4	5.13770+	1	4.71000+	4	4.63760+	0	4.72500+	4	8.63740+	09999	3	1	188
4.75000+	4	1.00370+	1	4.73500+	4	1.02370+	1	4.74000+	4	9.63730+	09999	3	1	189
4.76000+	4	6.73710+	0	4.76000+	4	5.13710+	0	4.80000+	4	4.63700+	09999	3	1	190
4.94000+	4	4.63660+	0	4.86000+	4	3.73570+	0	4.88000+	4	3.43640+	09999	3	1	191
4.90000+	4	3.13630+	0	4.92000+	4	2.66520+	0	4.94000+	4	2.36610+	09999	3	1	192
4.99500+	4	3.13600+	0	4.96500+	4	3.14600+	0	5.00000+	4	1.53590+	09999	3	1	193
5.01250+	4	1.41050+	0	5.02300+	4	1.41050+	0	5.05120+	4	1.07860+	19999	3	1	194
5.05650+	4	1.06360+	1	5.03750+	4	3.93550+	0	5.10000+	4	3.83540+	09999	3	1	195
5.11250+	4	4.06550+	0	5.12500+	4	3.03510+	0	5.15000+	4	2.45350+	19999	3	1	196
5.16120+	4	2.56350+	1	5.16250+	4	2.50350+	1	5.22500+	4	9.73470+	09999	3	1	197
5.25000+	4	6.63450+	0	5.27500+	4	3.73440+	0	5.29000+	4	2.50930+	09999	3	1	198
5.31000+	4	1.14340+	1	5.35000+	4	6.83410+	0	5.36250+	4	7.53400+	09999	3	1	199
5.37500+	4	9.43400+	0	5.40000+	4	2.20340+	1	5.40620+	4	2.25340+	19999	3	1	200
5.41250+	4	2.26340+	1	5.43750+	4	7.53350+	0	5.50000+	4	6.73370+	09999	3	1	201
5.52500+	4	6.13350+	0	5.55000+	4	5.33330+	0	5.57500+	4	4.53320+	09999	3	1	202
5.58750+	4	4.33320+	0	5.61000+	4	3.13310+	0	5.61250+	4	3.03310+	09999	3	1	203
5.52200+	4	4.13300+	0	5.65000+	4	1.40330+	1	5.65620+	4	1.50330+	19999	3	1	204
5.66250+	4	1.40330+	1	5.67500+	4	9.03290+	0	5.70000+	4	6.93290+	09999	3	1	205
5.75000+	4	5.33250+	0	5.77500+	4	4.63240+	1	5.79400+	4	5.03230+	09999	3	1	206
5.80000+	4	4.93230+	0	5.81250+	4	3.83220+	0	5.82500+	4	3.43220+	09999	3	1	207
5.85000+	4	2.64200+	0	5.87500+	4	2.13230+	0	5.91200+	4	1.33320+	19999	3	1	208
5.92000+	4	1.75320+	1	5.92500+	4	1.72323+	1	5.93000+	4	1.60320+	19999	3	1	209
5.96250+	4	8.03160+	0	5.97000+	4	7.73160+	0	5.97500+	4	7.93150+	09999	3	1	210
6.010000+	4	1.30320+	1	6.03620+	4	1.33310+	1	6.01250+	4	1.33810+	19999	3	1	211
6.012500+	4	9.03140+	0	6.03000+	4	8.33140+	0	6.05000+	4	7.13130+	09999	3	1	212
6.07500+	4	5.53120+	0	6.09500+	4	4.23110+	0	6.10000+	4	4.18110+	09999	3	1	213
6.111000+	4	4.19110+	0	6.11250+	4	4.63110+	0	6.12500+	4	8.03100+	09999	3	1	214
6.13000+	4	1.05310+	1	5.13500+	4	1.07310+	1	6.14000+	4	1.45310+	19999	3	1	215
6.15000+	4	6.23090+	0	6.17500+	4	6.13090+	0	6.20000+	4	5.43080+	09999	3	1	216
6.21250+	4	5.25573+	0	6.22500+	4	5.1870/+	0	6.23750+	4	5.13060+	09999	3	1	217
6.25000+	4	4.73050+	0	6.25250+	4	4.03040+	0	6.27500+	4	3.43030+	09999	3	1	218
6.31000+	4	7.23030+	0	6.31250+	4	7.33020+	0	6.31500+	4	7.23020+	09999	3	1	219
6.36250+	4	4.23010+	0	6.38750+	4	4.63000+	0	6.39000+	4	4.63000+	09999	3	1	220
6.42500+	4	4.22990+	0	6.45600+	4	3.77930+	0	6.47500+	4	3.47980+	09999	3	1	221
6.50000+	4	3.32970/+	0	6.52500+	4	3.22960+	0	6.55000+	4	3.12950+	09999	3	1	222
6.56250+	4	2.97950+	0	6.57500+	4	2.72940+	0	6.60000+	4	2.12930+	09999	3	1	223
6.63750+	4	7.62920+	0	6.64000+	4	7.52920+	0	6.64500+	4	7.42920+	09999	3	1	224
6.65000+	4	7.32920+	0	6.67600+	4	4.22210+	0	6.68750+	4	3.62900+	09999	3	1	225
5.70000+	4	3.37900+	0	6.72500+	4	3.02390+	0	6.75000+	4	2.92880+	09999	3	1	226
6.75630+	4	2.90660+	0	6.75250+	4	2.92680+	0	6.77500+	4	3.12880+	09999	3	1	227
6.78000+	4	3.27570+	0	6.75500+	4	3.02370+	0	6.79000+	4	3.27570+	09999	3	1	228
6.80000+	4	2.77570+	0	6.81250+	4	2.52550+	0	6.82500+	4	2.37660+	09999	3	1	229
6.85150+	4	2.27350+	0	6.85000+	4	2.25350+	0	6.86250+	4	2.32850+	09999	3	1	230
6.87500+	4	2.52640+	0	6.84800+	4	2.56540+	0	6.84500+	4	2.57640+	09999	3	1	231
6.89000+	4	2.555840+	0	6.93000+	4	2.27630+	0	6.92500+	4	1.67330+	09999	3	1	232
6.93550+	4	1.67320+	0	6.92500+	4	1.64120+	0	6.96250+	4	1.53810+	09999	3	1	233
6.97200+	4	2.05310+	0	6.93750+	4	1.92300+	0	7.02500+	4	1.12230+	19999	3	1	234
7.03000+	4	1.10320+	1	7.05510+	4	1.12220+	1	7.04000+	4	1.10220+	19999	3	1	235
7.15000+	4	9.05790+	0	7.07500+	4	9.72750+	0	7.10000+	4	4.32780+	09999	3	1	235
7.12200+	4	3.42770+	0	7.13720+	4	3.02271/+	0	7.14000+	4	3.32770+	09999	3	1	237
7.12000+	4	3.12770+	0	7.21250+	4	1.10130+	1	7.22000+	4	1.11230+	19999	3	1	238
7.22000+	4	2.05220+	1	7.23150+	4	0.527930+	0	7.24000+	4	5.17750+	09999	3	1	239

7.25000	4	5.32743	3	7.27000	4	1.13270	1	7.27250	4	1.14270	1	19999	3	1	240
7.27000	4	1.13270	1	7.35300	4	5.12720	0	7.35800	4	4.92720	0	09999	3	1	241
7.35250	4	4.32723	0	7.37900	4	4.67720	0	7.38750	4	4.52710	0	09999	3	1	242
7.40000	4	4.67710	0	7.42500	4	3.42710	0	7.43750	4	3.22700	0	09999	3	1	243
7.45000	4	3.14700	0	7.46250	4	3.12700	0	7.49000	4	4.12690	0	09999	3	1	244
7.49000	4	4.15590	0	7.50000	4	3.07590	0	7.54500	4	2.57680	0	09999	3	1	245
7.55000	4	2.55000	0	7.56000	4	2.57680	0	7.58000	4	2.92670	0	09999	3	1	246
7.59000	4	3.32670	0	7.59500	4	2.92670	0	7.65000	4	1.67660	0	09999	3	1	247
7.67000	4	1.32650	0	7.67500	4	1.42660	0	7.72500	4	1.00260	0	19999	3	1	248
7.72500	4	1.19250	1	7.73000	4	1.20260	1	7.82500	4	4.07630	0	09999	3	1	249
7.75000	4	3.32630	0	7.87500	4	2.77620	0	7.90000	4	2.33610	0	09999	3	1	250
7.771250	4	2.24010	0	7.92500	4	2.27610	0	7.94250	4	1.05260	0	19999	3	1	251
7.97000	4	1.10260	1	7.97500	4	1.04260	1	8.00000	4	5.32600	0	09999	3	1	252
8.01250	4	4.32600	0	8.02500	4	4.07590	0	8.05000	4	3.12590	0	09999	3	1	253
8.06250	4	2.67590	0	8.07500	4	2.16550	0	8.08750	4	1.67580	0	09999	3	1	254
8.11000	4	1.37530	0	8.11250	4	1.32530	0	8.12500	4	1.42570	0	09999	3	1	255
8.15000	4	3.32570	0	8.18500	4	9.62550	0	8.19500	4	9.72560	0	09999	3	1	256
8.20000	4	8.02560	0	8.22500	4	4.52550	0	8.25000	4	3.02540	0	09999	3	1	257
8.27000	4	2.17540	0	8.28750	4	1.87540	0	8.30000	4	1.81530	0	09999	3	1	258
8.31000	4	1.72530	0	8.31250	4	1.82530	0	8.35000	4	5.62520	0	09999	3	1	259
8.35000	4	6.22520	0	8.35000	4	6.32520	0	5.37500	4	5.72520	0	09999	3	1	260
8.36750	4	5.32510	0	8.40000	4	5.42510	0	8.44500	4	9.82500	0	09999	3	1	261
8.45000	4	1.00250	1	8.45500	4	9.82500	0	8.47500	4	5.72500	0	09999	3	1	262
8.50000	4	4.72490	0	8.52500	4	3.57490	0	8.53750	4	3.14480	0	09999	3	1	263
8.55000	4	2.72430	0	8.57500	4	1.92480	0	8.58750	4	1.52470	0	09999	3	1	264
8.60000	4	1.57470	0	8.62000	4	1.77470	0	8.62500	4	1.77470	0	09999	3	1	265
8.63750	4	1.67470	0	8.65000	4	1.57460	0	8.67500	4	1.56450	0	09999	3	1	266
8.68750	4	1.55460	0	8.70000	4	1.48450	0	8.71250	4	1.37450	0	09999	3	1	267
8.72500	4	1.11450	0	8.73750	4	1.09950	0	8.75000	4	1.15440	0	09999	3	1	268
8.82500	4	7.52430	0	8.83500	4	9.22430	0	8.83750	4	9.82430	0	09999	3	1	269
8.85000	4	1.19240	1	8.86250	4	1.35240	1	8.87500	4	1.45240	1	19999	3	1	270
8.86750	4	1.55240	1	8.89500	4	1.55240	1	8.90000	4	1.57240	1	19999	3	1	271
8.91000	4	1.56240	1	8.91250	4	1.50240	1	8.92500	4	1.30240	1	19999	3	1	272
9.03750	4	2.67330	0	9.02750	4	2.47330	0	9.09000	4	2.42390	0	09999	3	1	273
9.10000	4	2.44330	0	9.12500	4	2.97380	0	9.13750	4	3.32380	0	09999	3	1	274
9.15000	4	3.62330	0	9.16250	4	3.92370	0	9.17500	4	4.17370	0	09999	3	1	275
9.18750	4	4.533370	0	9.21000	4	4.42370	0	9.21250	4	4.60370	0	09999	3	1	276
9.22500	4	5.123360	0	9.25000	4	7.02360	0	9.27500	4	1.10240	0	19999	3	1	277
9.30000	4	1.30240	1	9.31250	4	2.10230	1	9.32500	4	1.30230	1	19999	3	1	278
9.37500	4	1.16230	1	9.35750	4	1.05230	1	9.40000	4	1.05230	1	19999	3	1	279
9.41250	4	1.10233	1	9.42500	4	1.18230	1	9.43000	4	1.20230	1	19999	3	1	280
9.43750	4	1.18230	1	9.45000	4	1.10230	1	9.46250	4	9.92320	0	09999	3	1	281
9.47500	4	9.52323	0	9.48750	4	9.92310	0	9.50000	4	1.12230	0	19999	3	1	282
9.52500	4	1.42230	1	9.53000	4	1.50230	1	9.53750	4	1.51230	1	19999	3	1	283
9.54000	4	1.50230	1	9.55000	4	1.40230	1	9.65000	4	2.37290	0	09999	3	1	284
9.56250	4	1.43290	0	9.67500	4	1.71290	0	9.68750	4	1.66280	0	09999	3	1	285
9.70000	4	1.71280	0	9.71000	4	1.72280	0	9.71250	4	1.62280	0	09999	3	1	286
9.72500	4	2.22250	0	9.81250	4	1.30230	1	9.82500	4	1.59230	1	19999	3	1	287
9.73750	4	1.72730	1	9.85000	4	1.85230	1	9.86250	4	1.96230	1	19999	3	1	288
9.75000	4	1.93230	1	9.93000	4	1.95230	1	9.92500	4	1.93230	1	19999	3	1	289
9.77500	4	1.77230	1	9.97500	4	1.53230	1	9.98750	4	1.20230	1	19999	3	1	290
1.00000E-03	.10000E-02	.10000E-06	.13700E-02	.100050E-06	.15600E-06	.029999	3	1	291						
.114500E-05	.14500E-02	.10100E-06	.12300E-02	.10130E-06	.10100E-06	.029999	3	1	292						
.114500E-06	.82300E-01	.10130E-06	.10500E-02	.10200E-06	.13400E-06	.029999	3	1	293						
.112300E-06	.11700E-02	.10200E-06	.10700E-02	.10250E-06	.11500E-06	.029999	3	1	294						
.113000E-07	.10600E-01	.10300E-06	.10600E-02	.10350E-06	.93500E-06	.019999	3	1	295						
.113300E-06	.52400E-01	.10400E-06	.57900E-01	.10430E-06	.566200E-06	.019999	3	1	296						
.114500E-06	.63500E-01	.10460E-06	.56200E-01	.10510E-06	.44900E-06	.019999	3	1	297						
.115000E-07	.37200E-01	.10500E-06	.34900E-01	.10540E-06	.56400E-06	.019999	3	1	298						
.115000E-08	.72000E-01	.105630E-06	.42700E-01	.10650E-06	.71400E-06	.019999	3	1	299						

.10680E	06	.65700E	01	.10700E	06	.91000E	01	.13720E	06	.66500E	01	99999	3	1
.10700E	06	.57300E	01	.10770E	06	.23100E	01	.10300E	06	.55500E	01	99999	3	1
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.10940E	05	.67400E	01	.10920E	06	.72500E	01	.10950E	06	.67700E	01	99999	3	1
.10970E	05	.52300E	01	.11000E	06	.52300E	01	.11020E	06	.73700E	01	99999	3	1
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.11120E	05	.70900E	01	.11150E	06	.59600E	01	.11170E	06	.44600E	01	99999	3	1
.11200E	05	.30500E	01	.11220E	06	.56500E	01	.11250E	06	.31200E	01	99999	3	1
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.11500E	06	.84500E	01	.11520E	06	.36400E	01	.11550E	06	.37300E	01	99999	3	1
.11570E	05	.86400E	01	.11600E	06	.70000E	01	.11620E	06	.65600E	01	99999	3	1
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.13320E	05	.66000E	01	.13390E	06	.36200E	01	.13460E	06	.72800E	01	99999	3	1
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.26260E	05	.19140E	01	.26300E	05	.22560E	01	.26340E	05	.23460E	019999	3	1
.26380E	05	.23400E	01	.26420E	05	.35520E	01	.26460E	05	.41440E	019999	3	1
.26500E	05	.40450E	01	.26540E	05	.42960E	01	.26580E	06	.46180E	019999	3	1
.26620E	05	.36390E	01	.26660E	06	.21230E	01	.26700E	06	.15920E	019999	3	1
.26740E	05	.23960E	01	.26780E	05	.41910E	01	.26820E	05	.46010E	019999	3	1
.26860E	05	.60440E	01	.26900E	06	.66470E	01	.26940E	06	.56400E	019999	3	1
.26980E	05	.45510E	01	.27020E	06	.42120E	01	.27060E	05	.53370E	019999	3	1
.27100E	05	.44340E	01	.27140E	05	.37120E	01	.27180E	06	.36090E	019999	3	1
.27220E	05	.31790E	01	.27250E	05	.32000E	01	.27300E	05	.37210E	019999	3	1
.27340E	05	.36420E	01	.27380E	05	.30530E	01	.27420E	06	.33830E	019999	3	1
.27460E	05	.54730E	01	.27500E	05	.55160E	01	.27540E	06	.47430E	019999	3	1
.27550E	05	.60630E	01	.27620E	05	.59710E	01	.27660E	05	.37900E	019999	3	1
.27700E	05	.36160E	01	.27740E	05	.40550E	01	.27780E	05	.23370E	019999	3	1
.27820E	05	.26180E	01	.27860E	05	.47640E	01	.27900E	05	.64130E	019999	3	1
.27940E	05	.44830E	01	.27980E	05	.37570E	01	.28020E	05	.46590E	019999	3	1
.28060E	05	.46120E	01	.28100E	06	.38220E	01	.28140E	05	.31430E	019999	3	1
.28180E	05	.30710E	01	.28220E	05	.30300E	01	.28260E	05	.37450E	019999	3	1
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.28420E	05	.56340E	01	.28460E	05	.49520E	01	.28500E	05	.53770E	019999	3	1
.28540E	05	.52930E	01	.28550E	05	.46740E	01	.28620E	05	.38720E	019999	3	1
.28660E	05	.44430E	01	.28700E	05	.35730E	01	.28740E	05	.33700E	019999	3	1
.28770E	05	.59750E	01	.28820E	05	.72120E	01	.28860E	05	.53300E	019999	3	1
.28890E	05	.44240E	01	.28940E	05	.46730E	01	.28960E	05	.38440E	019999	3	1
.28920E	05	.43550E	01	.29050E	05	.52530E	01	.29100E	05	.47560E	019999	3	1
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.29260E	05	.533690E	01	.29300E	06	.47500E	01	.29340E	06	.34400E	01	9999	3	1
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.29500E	06	.343860E	01	.29540E	05	.31920E	01	.29580E	06	.24680E	01	9999	3	1
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.29740E	05	.31750E	01	.29740E	06	.50120E	01	.29820E	05	.57120E	01	9999	3	1
.29860E	06	.51970E	01	.29900E	05	.61910E	01	.29940E	06	.59120E	01	9999	3	1
.29980E	05	.47280E	01	.30000E	06	.39770E	01	.30020E	05	.32260E	01	9999	3	1
.30060E	05	.30250E	01	.30100E	06	.49700E	01	.30140E	06	.53470E	01	9999	3	1
.30180E	05	.47280E	01	.30220E	05	.44160E	01	.30260E	06	.33130E	01	9999	3	1
.30300E	05	.33570E	01	.30340E	05	.31230E	01	.30330E	06	.24860E	01	9999	3	1
.30420E	05	.26400E	01	.30460E	06	.25040E	01	.30500E	06	.27320E	01	9999	3	1
.30540E	06	.42360E	01	.30580E	06	.45650E	01	.30620E	06	.31150E	01	9999	3	1
.30660E	06	.35050E	01	.30700E	06	.44910E	01	.30740E	05	.44500E	01	9999	3	1
.30780E	05	.43940E	01	.30820E	06	.46420E	01	.30860E	05	.65400E	01	9999	3	1
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.31140E	06	.41220E	01	.31180E	05	.45900E	01	.31220E	06	.47340E	01	9999	3	1
.31260E	05	.34550E	01	.31300E	05	.30350E	01	.31340E	06	.41540E	01	9999	3	1
.31380E	05	.49690E	01	.31420E	06	.42560E	01	.31460E	06	.30550E	01	9999	3	1
.31500E	06	.24110E	01	.31540E	06	.41320E	01	.31580E	06	.54140E	01	9999	3	1
.31620E	05	.47590E	01	.31650E	06	.40000E	01	.31700E	06	.38920E	01	9999	3	1
.31740E	06	.45290E	01	.31780E	05	.39540E	01	.31820E	06	.45450E	01	9999	3	1
.31860E	06	.51290E	01	.31900E	06	.39190E	01	.31940E	06	.37830E	01	9999	3	1
.31980E	05	.45750E	01	.32020E	06	.51400E	01	.32060E	06	.55130E	01	9999	3	1
.32100E	06	.51550E	01	.32140E	05	.47020E	01	.32180E	06	.52920E	01	9999	3	1
.32220E	05	.43530E	01	.32260E	06	.44710E	01	.32300E	06	.46320E	01	9999	3	1
.32340E	06	.45260E	01	.32380E	05	.31360E	01	.32420E	06	.28750E	01	9999	3	1
.32460E	05	.44660E	01	.32500E	06	.43200E	01	.32540E	06	.41200E	01	9999	3	1
.32580E	06	.43300E	01	.32620E	06	.38560E	01	.32660E	06	.35980E	01	9999	3	1
.32700E	05	.43010E	01	.32740E	06	.51350E	01	.32780E	06	.51710E	01	9999	3	1
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.32940E	05	.45850E	01	.32980E	06	.39540E	01	.33020E	06	.37530E	01	9999	3	1
.33060E	06	.54080E	01	.33100E	05	.63210E	01	.33140E	06	.60360E	01	9999	3	1
.33180E	06	.55250E	01	.33220E	06	.55730E	01	.33260E	06	.54870E	01	9999	3	1
.33300E	06	.52510E	01	.33340E	06	.38640E	01	.33380E	06	.35900E	01	9999	3	1
.33420E	05	.53750E	01	.33460E	05	.65510E	01	.33500E	05	.57640E	01	9999	3	1
.33540E	05	.49710E	01	.33550E	06	.50820E	01	.33620E	06	.47430E	01	9999	3	1
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.33780E	05	.50770E	01	.33820E	05	.43140E	01	.33860E	05	.48760E	01	9999	3	1
.33900E	05	.37590E	01	.33940E	06	.34070E	01	.33980E	06	.44650E	01	9999	3	1
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.34380E	06	.36210E	01	.34420E	06	.32970E	01	.34460E	06	.23850E	01	9999	3	1
.34500E	05	.31180E	01	.34540E	06	.43690E	01	.34580E	06	.33690E	01	9999	3	1
.34620E	05	.44130E	01	.34660E	06	.46570E	01	.34700E	05	.43960E	01	9999	3	1
.34740E	05	.47840E	01	.34780E	06	.46110E	01	.34820E	06	.56770E	01	9999	3	1
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.34980E	05	.40630E	01	.35020E	06	.39830E	01	.35060E	05	.32500E	01	9999	3	1
.35100E	05	.37370E	01	.35140E	06	.34600E	01	.35180E	05	.30800E	01	9999	3	1
.35220E	06	.40340E	01	.35260E	06	.46130E	01	.35300E	06	.46130E	01	9999	3	1
.35340E	06	.37400E	01	.35380E	06	.39850E	01	.35420E	06	.40620E	01	9999	3	1
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.35700E	05	.51490E	01	.35740E	06	.40160E	01	.35780E	06	.32220E	01	9999	3	1
.35820E	05	.24210E	01	.35860E	05	.27410E	01	.35900E	05	.31190E	01	9999	3	1
.35940E	06	.39890E	01	.35950E	06	.45530E	01	.36010E	06	.52100E	01	9999	3	1
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.36160E	05	.63660E	01	.36180E	06	.71460E	01	.36210E	06	.64780E	01	9999	3	1
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.35340E	06	.43100E	01	.35370E	06	.40400E	01	.36390E	06	.40400E	019999	3	1	4
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.35480E	05	.45700E	01	.36500E	06	.42100E	01	.36540E	06	.35600E	019999	3	1	4
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.37840E	05	.40500E	01	.37880E	06	.40600E	01	.37910E	06	.47000E	019999	3	1	4
.37950E	05	.43800E	01	.37990E	06	.50100E	01	.38050E	06	.52000E	019999	3	1	5
.38120E	05	.57500E	01	.38160E	06	.57800E	01	.38220E	06	.45800E	019999	3	1	5
.38300E	05	.40200E	01	.38400E	06	.31500E	01	.38430E	06	.29100E	019999	3	1	5
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.38790E	05	.42200E	01	.38830E	06	.42100E	01	.38860E	06	.37500E	019999	3	1	5
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.39230E	05	.24700E	01	.39230E	06	.30100E	01	.39320E	06	.35100E	019999	3	1	5
.39350E	05	.35200E	01	.39390E	06	.27700E	01	.39410E	06	.25300E	019999	3	1	5
.39450E	05	.28000E	01	.39470E	06	.27600E	01	.39500E	06	.38000E	019999	3	1	5
.39530E	05	.43400E	01	.39560E	06	.43200E	01	.39600E	06	.35300E	019999	3	1	5
.39610E	05	.34300E	01	.39650E	06	.41700E	01	.39690E	06	.46600E	019999	3	1	5
.39740E	05	.50100E	01	.39790E	06	.49600E	01	.39850E	06	.41400E	019999	3	1	5
.39900E	05	.33200E	01	.39950E	06	.29700E	01	.40010E	06	.27000E	019999	3	1	5
.40040E	05	.20500E	01	.40110E	06	.19400E	01	.40150E	06	.15000E	019999	3	1	5
.40140E	05	.14200E	01	.40250E	06	.28300E	01	.40280E	06	.24600E	019999	3	1	5
.40310E	05	.21600E	01	.40340E	06	.17800E	01	.40410E	06	.33100E	019999	3	1	5
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.40570E	05	.26700E	01	.40620E	06	.16800E	01	.40640E	06	.15900E	019999	3	1	5
.40710E	05	.39600E	01	.40770E	06	.27700E	01	.40820E	06	.17700E	019999	3	1	5
.40890E	05	.11600E	01	.40960E	06	.17200E	01	.40990E	06	.20600E	019999	3	1	5
.41010E	05	.23200E	01	.41030E	06	.23600E	01	.41060E	06	.33900E	019999	3	1	5
.41140E	05	.45500E	01	.41190E	06	.49900E	01	.41230E	06	.55100E	019999	3	1	5
.41270E	05	.52600E	01	.41310E	06	.50200E	01	.41340E	06	.60000E	019999	3	1	5
.41460E	05	.43100E	01	.41490E	06	.42300E	01	.41550E	06	.44700E	019999	3	1	5
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.41800E	05	.15300E	01	.41830E	06	.10500E	01	.41870E	06	.10400E	019999	3	1	5
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.42030E	05	.52200E	01	.42110E	06	.53400E	01	.42150E	06	.54300E	019999	3	1	5
.42210E	05	.53100E	01	.42270E	06	.47000E	01	.42330E	06	.52400E	019999	3	1	5
.42370E	05	.51200E	01	.42450E	06	.41400E	01	.42490E	06	.42500E	019999	3	1	5
.42610E	05	.36300E	01	.42670E	06	.44600E	01	.42690E	06	.52400E	019999	3	1	5
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.42950E	05	.47400E	01	.43030E	06	.33500E	01	.43140E	06	.29000E	019999	3	1	5
.43160E	05	.24200E	01	.43220E	06	.25600E	01	.43330E	06	.35600E	019999	3	1	5
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.43590E	05	.37100E	01	.43770E	06	.51500E	01	.43800E	06	.51500E	01	9999	3	1
.43570E	05	.44100E	01	.43910E	05	.43800E	01	.43940E	06	.49200E	01	9999	3	1
.43970E	05	.50500E	01	.44010E	06	.43400E	01	.44050E	06	.35400E	01	9999	3	1
.44100E	05	.31300E	01	.44150E	06	.38700E	01	.44250E	05	.43700E	01	9999	3	1
.44320E	05	.39500E	01	.44330E	06	.44900E	01	.44480E	06	.37600E	01	9999	3	1
.44250E	05	.45000E	01	.44520E	06	.44430E	01	.44710E	06	.33900E	01	9999	3	1
.44740E	05	.34400E	01	.44800E	06	.39200E	01	.44680E	05	.39500E	01	9999	3	1
.44930E	05	.45700E	01	.45070E	06	.30900E	01	.45110E	06	.23500E	01	9999	3	1
.45140E	05	.25400E	01	.45200E	06	.37200E	01	.45280E	06	.51200E	01	9999	3	1
.45350E	05	.32500E	01	.45390E	06	.29700E	01	.45470E	06	.35700E	01	9999	3	1
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.47540E	05	.57200E	01	.47600E	06	.32900E	01	.47650E	06	.52600E	01	9999	3	1
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.11040E	07	.24900E	01	.11070E	07	.31200E	01	.11100E	07	.32100E	019999	3	1	72
.11130E	07	.29700E	01	.11160E	07	.34700E	01	.11180E	07	.35500E	019999	3	1	73
.11190E	07	.35900E	01	.11210E	07	.35200E	01	.11230E	07	.36700E	019999	3	1	73
.11270E	07	.36100E	01	.11310E	07	.36100E	01	.11350E	07	.32700E	019999	3	1	73
.11400E	07	.31300E	01	.11450E	07	.34300E	01	.11480E	07	.31500E	019999	3	1	73
.11500E	07	.32500E	01	.11550E	07	.29600E	01	.11570E	07	.35100E	019999	3	1	73
.11590E	07	.33400E	01	.11600E	07	.31100E	01	.11650E	07	.35100E	019999	3	1	73
.11690E	07	.34300E	01	.11720E	07	.30100E	01	.11740E	07	.30800E	019999	3	1	73
.11760E	07	.26900E	01	.11790E	07	.32500E	01	.11840E	07	.31500E	019999	3	1	73
.11880E	07	.37300E	01	.11900E	07	.35300E	01	.11930E	07	.33100E	019999	3	1	73
.11960E	07	.33000E	01	.11990E	07	.36600E	01	.12000E	07	.34970E	019999	3	1	73
.12030E	07	.31900E	01	.12070E	07	.33900E	01	.12100E	07	.34200E	019999	3	1	73
.12110E	07	.33800E	01	.12130E	07	.30600E	01	.12150E	07	.29000E	019999	3	1	74
.12180E	07	.26700E	01	.12220E	07	.33000E	01	.12250E	07	.30200E	019999	3	1	74
.12290E	07	.32500E	01	.12310E	07	.37300E	01	.12360E	07	.32300E	019999	3	1	74
.12380E	07	.32900E	01	.12410E	07	.39300E	01	.12430E	07	.39900E	019999	3	1	74
.12450E	07	.38300E	01	.12480E	07	.37400E	01	.12500E	07	.34350E	019999	3	1	74
.12520E	07	.31300E	01	.12550E	07	.32500E	01	.12600E	07	.34400E	019999	3	1	74
.12630E	07	.30600E	01	.12670E	07	.33800E	01	.12710E	07	.33300E	019999	3	1	74
.12740E	07	.37400E	01	.12780E	07	.39400E	01	.12800E	07	.37400E	019999	3	1	74
.12830E	07	.32500E	01	.12860E	07	.33400E	01	.12910E	07	.33300E	019999	3	1	74
.12930E	07	.35100E	01	.12960E	07	.35100E	01	.12990E	07	.35200E	019999	3	1	74
.13000E	07	.34200E	01	.13030E	07	.28200E	01	.13070E	07	.32500E	019999	3	1	75
.13090E	07	.30300E	01	.13130E	07	.29950E	01	.13160E	07	.29700E	019999	3	1	75
.13190E	07	.32200E	01	.13230E	07	.27530E	01	.13250E	07	.30400E	019999	3	1	75
.13320E	07	.35300E	01	.13340E	07	.33700E	01	.13360E	07	.31300E	019999	3	1	75
.13380E	07	.33300E	01	.13420E	07	.33910E	01	.13440E	07	.31300E	019999	3	1	75
.13460E	07	.32200E	01	.13520E	07	.26900E	01	.13560E	07	.33200E	019999	3	1	75
.13610E	07	.35900E	01	.13570E	07	.30530E	01	.13710E	07	.32700E	019999	3	1	75
.13730E	07	.31900E	01	.13760E	07	.33200E	01	.13820E	07	.27400E	019999	3	1	75
.13870E	07	.33700E	01	.13900E	07	.34300E	01	.13940E	07	.33500E	019999	3	1	75
.13990E	07	.23500E	01	.14000E	07	.29600E	01	.14020E	07	.31800E	019999	3	1	75
.14050E	07	.32700E	01	.14070E	07	.33330E	01	.14090E	07	.30700E	019999	3	1	76
.14110E	07	.35500E	01	.14140E	07	.32700E	01	.14160E	07	.32300E	019999	3	1	76
.14200E	07	.29700E	01	.14250E	07	.33600E	01	.14300E	07	.31100E	019999	3	1	76
.14320E	07	.31100E	01	.14420E	07	.31200E	01	.14460E	07	.22200E	019999	3	1	76
.14510E	07	.32200E	01	.14570E	07	.29600E	01	.14640E	07	.29500E	019999	3	1	76
.14680E	07	.31300E	01	.14710E	07	.28000E	01	.14760E	07	.33400E	019999	3	1	76
.14800E	07	.32700E	01	.14530E	07	.30900E	01	.14840E	07	.31660E	019999	3	1	76
.14880E	07	.34700E	01	.14940E	07	.29100E	01	.15000E	07	.32350E	019999	3	1	76
.15020E	07	.34100E	01	.15070E	07	.30500E	01	.15100E	07	.31400E	019999	3	1	76
.15140E	07	.30300E	01	.15180E	07	.32700E	01	.15260E	07	.32200E	019999	3	1	76
.15300E	07	.30300E	01	.15400E	07	.31900E	01	.15440E	07	.32900E	019999	3	1	77
.15500E	07	.30400E	01	.15500E	07	.37000E	01	.15670E	07	.33900E	019999	3	1	77
.15700E	07	.34200E	01	.15770E	07	.36900E	01	.15860E	07	.37400E	019999	3	1	77
.15940E	07	.35600E	01	.16000E	07	.36700E	01	.16340E	07	.36900E	019999	3	1	77
.15100E	07	.36500E	01	.16130E	07	.34500E	01	.16170E	07	.35200E	019999	3	1	77
.15230E	07	.32400E	01	.16260E	07	.34400E	01	.16320E	07	.32100E	019999	3	1	77
.15370E	07	.34300E	01	.16390E	07	.33700E	01	.16440E	07	.35200E	019999	3	1	77
.15470E	07	.35700E	01	.16530E	07	.34300E	01	.16600E	07	.31800E	019999	3	1	77
.15650E	07	.31300E	01	.16c70E	07	.33300E	01	.16710E	07	.32200E	019999	3	1	77
.15740E	07	.33700E	01	.16e00E	07	.33330E	01	.16830E	07	.32200E	019999	3	1	77

.17000E	07	.31200E	01	.17040E	07	.31200E	01	.17100E	07	.34500E	01	99999	3	1	7
.17150E	07	.32400E	01	.17190E	07	.34400E	01	.17290E	07	.31200E	01	99999	3	1	7
.17300E	07	.33100E	01	.17400E	07	.31400E	01	.17460E	07	.23200E	01	99999	3	1	7
.17400E	07	.29600E	01	.17560E	07	.35300E	01	.17600E	07	.30200E	01	99999	3	1	7
.17500E	07	.27500E	01	.17710E	07	.20300E	01	.17730E	07	.29790E	01	99999	3	1	7
.17730E	07	.35000E	01	.17810E	07	.34000E	01	.17870E	07	.32300E	01	99999	3	1	7
.17920E	07	.33900E	01	.17960E	07	.33600E	01	.18000E	07	.36100E	01	99999	3	1	7
.18020E	07	.35200E	01	.18070E	07	.31800E	01	.18100E	07	.33000E	01	99999	3	1	7
.18120E	07	.33800E	01	.18170E	07	.29100E	01	.18250E	07	.34600E	01	99999	3	1	7
.18350E	07	.34100E	01	.18420E	07	.36400E	01	.18490E	07	.37500E	01	99999	3	1	7
.18500E	07	.31000E	01	.18620E	07	.33700E	01	.18660E	07	.33300E	01	99999	3	1	7
.18740E	07	.31200E	01	.18790E	07	.32100E	01	.18830E	07	.30200E	01	99999	3	1	7
.18930E	07	.36400E	01	.19000E	07	.33690E	01	.19010E	07	.33300E	01	99999	3	1	7
.19060E	07	.34100E	01	.19230E	07	.33100E	01	.19340E	07	.34800E	01	99999	3	1	7
.19430E	07	.32000E	01	.19500E	07	.32500E	01	.19550E	07	.31500E	01	99999	3	1	7
.19640E	07	.32800E	01	.19710E	07	.33800E	01	.19760E	07	.31500E	01	99999	3	1	7
.19850E	07	.30400E	01	.19900E	07	.33300E	01	.19950E	07	.33100E	01	99999	3	1	7
.20000E	07	.31530E	01	.20020E	07	.30900E	01	.20090E	07	.31300E	01	99999	3	1	7
.20100E	07	.30900E	01	.20140E	07	.32200E	01	.20310E	07	.31600E	01	99999	3	1	7
.20400E	07	.30400E	01	.20550E	07	.31600E	01	.20650E	07	.34100E	01	99999	3	1	7
.20880E	07	.31600E	01	.21040E	07	.35400E	01	.21050E	07	.33110E	01	99999	3	1	80
.21220E	07	.30200E	01	.21290E	07	.32500E	01	.21400E	07	.31700E	01	99999	3	1	80
.21460E	07	.35100E	01	.21550E	07	.32300E	01	.21700E	07	.31900E	01	99999	3	1	80
.21800E	07	.33400E	01	.21950E	07	.31200E	01	.21960E	07	.31350E	01	99999	3	1	80
.22000E	07	.31950E	01	.22130E	07	.33900E	01	.22190E	07	.32500E	01	99999	3	1	80
.22300E	07	.33700E	01	.22500E	07	.32800E	01	.22590E	07	.34700E	01	99999	3	1	80
.22740E	07	.32300E	01	.23010E	07	.33700E	01	.23190E	07	.32500E	01	99999	3	1	80
.23400E	07	.35300E	01	.23610E	07	.31800E	01	.23890E	07	.32200E	01	99999	3	1	80
.24000E	07	.34070E	01	.24090E	07	.35600E	01	.24310E	07	.32000E	01	99999	3	1	80
.24380E	07	.32900E	01	.24490E	07	.32650E	01	.24490E	07	.31500E	01	99999	3	1	80
.24620E	07	.34500E	01	.24750E	07	.32500E	01	.24790E	07	.33300E	01	99999	3	1	81
.25000E	07	.34000E	01	.25090E	07	.34300E	01	.25130E	07	.35100E	01	99999	3	1	81
.25280E	07	.34900E	01	.25340E	07	.33400E	01	.25420E	07	.33950E	01	99999	3	1	81
.25550E	07	.34900E	01	.25640E	07	.33900E	01	.25800E	07	.33900E	01	99999	3	1	81
.25940E	07	.35600E	01	.26000E	07	.35500E	01	.26060E	07	.35400E	01	99999	3	1	81
.26160E	07	.33600E	01	.26230E	07	.35600E	01	.26340E	07	.34500E	01	99999	3	1	81
.26410E	07	.35400E	01	.26590E	07	.33800E	01	.26660E	07	.34300E	01	99999	3	1	81
.26800E	07	.31900E	01	.26930E	07	.34600E	01	.27000E	07	.33900E	01	99999	3	1	81
.27040E	07	.33500E	01	.27190E	07	.34800E	01	.27320E	07	.32500E	01	99999	3	1	81
.27450E	07	.34300E	01	.27600E	07	.32900E	01	.27710E	07	.35100E	01	99999	3	1	81
.27800E	07	.33900E	01	.27920E	07	.35100E	01	.28000E	07	.34450E	01	99999	3	1	82
.28300E	07	.32000E	01	.25440E	07	.33800E	01	.28490E	07	.33300E	01	99999	3	1	82
.28650E	07	.34600E	01	.28910E	07	.32900E	01	.29100E	07	.33100E	01	99999	3	1	82
.29190E	07	.32400E	01	.29490E	07	.34500E	01	.29660E	07	.33300E	01	99999	3	1	82
.30000E	07	.33200E	01	.30490E	07	.34020E	01	.31520E	07	.34510E	01	99999	3	1	82
.32000E	07	.34730E	01	.32520E	07	.34940E	01	.35600E	07	.35430E	01	99999	3	1	82
.34000E	07	.35410E	01	.34630E	07	.35330E	01	.35000E	07	.35290E	01	99999	3	1	82
.32660E	07	.35100E	01	.36710E	07	.34730E	01	.37770E	07	.35430E	01	99999	3	1	82
.33830E	07	.35520E	01	.39890E	07	.35600E	01	.40000E	07	.35620E	01	99999	3	1	82
.41430E	07	.35476E	01	.43500E	07	.36130E	01	.45000E	07	.35400E	01	99999	3	1	829
.45570E	07	.35490E	01	.47630E	07	.36730E	01	.49000E	07	.37140E	01	99999	3	1	830
.49700E	07	.37320E	01	.50000E	07	.37310E	01	.51000E	07	.37260E	01	99999	3	1	831
.51600E	07	.37230E	01	.52000E	07	.37240E	01	.52320E	07	.37250E	01	99999	3	1	832
.53000E	07	.37290E	01	.53680E	07	.37330E	01	.54000E	07	.37350E	01	99999	3	1	833
.52000E	07	.37530E	01	.55950E	07	.37700E	01	.56000E	07	.37720E	01	99999	3	1	834
.57000E	07	.37610E	01	.58400E	07	.37520E	01	.58070E	07	.37710E	01	99999	3	1	835
.59010E	07	.37320E	01	.60000E	07	.37530E	01	.60150E	07	.37600E	01	99999	3	1	836
.61000E	07	.37390E	01	.62000E	07	.37270E	01	.63000E	07	.37120E	01	99999	3	1	837
.63010E	07	.37400E	01	.64310E	07	.37420E	01	.65000E	07	.36710E	01	99999	3	1	838
.66000E	07	.36620E	01	.67000E	07	.36740E	01	.66000E	07	.36650E	01	99999	3	1	839

.63860E	07	.36540E	01	.69000E	07	.36560E	01	.70000E	07	.36380E	019999	3	1	840
.71000E	07	.36210E	01	.72000E	07	.36030E	01	.73000E	07	.35360E	019999	3	1	841
.74000E	07	.35580E	01	.74020E	07	.35630E	01	.75000E	07	.35570E	019999	3	1	842
.76000E	07	.35450E	01	.77000E	07	.35330E	01	.78000E	07	.35220E	019999	3	1	843
.79000E	07	.35100E	01	.79200E	07	.35080E	01	.80000E	07	.34760E	019999	3	1	844
.81000E	07	.34500E	01	.82000E	07	.34640E	01	.83000E	07	.34490E	019999	3	1	845
.84000E	07	.34330E	01	.84400E	07	.34270E	01	.85000E	07	.34170E	019999	3	1	846
.89620E	07	.33420E	01	.90000E	07	.33340E	01	.90810E	07	.33330E	019999	3	1	847
.94770E	07	.33050E	01	.95000E	07	.33020E	01	.10000E	08	.32290E	019999	3	1	848
.10010E	05	.32280E	01	.10500E	08	.31490E	01	.10530E	08	.31440E	019999	3	1	849
.10640E	09	.31250E	01	.11000E	08	.30620E	01	.11060E	08	.30510E	019999	3	1	850
.11500E	05	.29950E	01	.11570E	08	.29870E	01	.12000E	08	.29260E	019999	3	1	851
.12100E	05	.29120E	01	.12500E	08	.28650E	01	.12630E	08	.28500E	019999	3	1	852
.13000E	05	.26000E	01	.13150E	08	.27800E	01	.13500E	08	.27420E	019999	3	1	853
.13690E	05	.27220E	01	.14000E	08	.26890E	01	.14220E	08	.26660E	019999	3	1	854
.14000E	05	.26320E	01	.14750E	08	.26080E	01	.15000E	08	.25890E	019999	3	1	855
.15290E	05	.25660E	01	.15500E	08	.25520E	01	.15820E	08	.25270E	019999	3	1	856
.15600E	03	.25160E	01	.16300E	08	.24940E	01	.16500E	08	.24850E	019999	3	1	857
.15900E	05	.24590E	01	.17000E	08	.24550E	01	.17440E	08	.24350E	019999	3	1	858
.17500E	05	.24330E	01	.17990E	08	.24170E	01	.18000E	08	.24170E	019999	3	1	859
.18540E	05	.23950E	01	.19000E	08	.23770E	01	.19100E	08	.23730E	019999	3	1	860
.19660E	05	.23580E	01	.20000E	08	.23580E	01			9999	3	1	861	
										9999	3	0	862	
2.70590+	4	5.84269+	1		0		99		0		09999	3	2	863
0.00000+	0	0.00000+	0		0		0		3		22319999	3	2	864
136	3	519		5		2231				29999	3	2	865	
1.00000-	5	0.00000+	0	3.00000+	2	0.00000+	0	3.50000+	2	3.50000-	19999	3	2	866
4.00000+	2	4.00000-	1	5.00000+	2	7.00000-	1	7.00000+	2	7.00000-	19999	3	2	867
8.00000+	2	6.75000-	1	9.00000+	2	6.50000-	1	1.20000+	3	5.50000-	19999	3	2	868
1.60000+	3	5.50000-	1	1.70000+	3	5.00000-	1	1.80000+	3	5.00000-	19999	3	2	869
1.90000+	3	4.75000-	1	2.00000+	3	4.75000-	1	2.10000+	3	4.25000-	19999	3	2	870
2.20000+	3	4.00000-	1	2.30000+	3	3.75000-	1	2.35000+	3	3.50000-	19999	3	2	871
2.40000+	3	3.40000-	1	2.45000+	3	3.20000-	1	2.50000+	3	3.10000-	19999	3	2	872
2.55000+	3	2.80000-	1	2.60000+	3	2.65000-	1	2.65000+	3	2.20000-	19999	3	2	873
2.70000+	3	1.80000-	1	2.75000+	3	1.20000-	1	2.80000+	3	1.00000-	19999	3	2	874
2.56000+	3	0.00000+	0	1.76000+	4	0.00000+	0	1.77000+	4-3.00000-	19999	3	2	875	
1.78000+	4-5.00000-	1	1.87000+	4-5.00000-	1	1.89000+	4-5.00000-	19999	3	2	876			
1.90000+	4-2.20000-	1	1.97000+	4-2.20000-	1	1.99000+	4-0.00000+	09999	3	2	877			
2.00000+	4-3.50000-	1	2.01000+	4-4.50000-	1	2.02000+	4-5.00000-	19999	3	2	878			
2.03000+	4-4-4.75000-	1	2.04000+	4-4.50000-	1	2.05000+	4-4.00000+	19999	3	2	879			
2.06000+	4-2.75000-	1	2.07000+	4-2.00000-	1	2.08000+	4-0.00000+	09999	3	2	880			
2.10000+	4	3.00000-	1	2.12000+	4	7.00000-	1	2.13000+	4	1.20000+	09999	3	2	881
2.14000+	4	1.40000+	0	2.15000+	4	3.00000+	0	2.16000+	4	3.00000+	09999	3	2	882
2.17000+	4	5.00000+	0	2.18000+	4	9.00000+	0	2.19000+	4	1.50000+	19999	3	2	883
2.20000+	4	1.50000+	1	2.21000+	4	6.50000+	0	2.22000+	4	2.50000+	09999	3	2	884
2.23000+	4	0.00000+	0	2.29000+	4	0.00000+	0	2.30000+	4-2.00000+	09999	3	2	885	
2.32000+	4-4.00000+	0	2.34000+	4-3.70000+	0	2.36000+	4-2.80000+	09999	3	2	886			
2.38000+	4-1.40000+	0	2.40000+	4-5.00000-	1	2.41000+	4-4.00000-	19999	3	2	887			
2.42000+	4	0.00000+	0	2.50000+	4	0.00000+	0	2.51000+	4	1.40000+	19999	3	2	888
2.52000+	4	1.20000+	1	2.53000+	4	2.00000+	0	2.54000+	4	0.03000+	09999	3	2	889
2.55000+	4-1.00000+	0	2.56000+	4-3.00000+	0	2.57000+	4-3.00000+	09999	3	2	890			
2.53000+	4-2.50000+	0	2.59000+	4-1.00000+	0	2.60000+	4	0.00000+	09999	3	2	891		
2.61000+	4	0.00000+	0	2.62000+	4-2.00000+	0	2.67000+	4-1.70000+	09999	3	2	892		
2.56000+	4-1.00000+	0	2.59000+	4-4.00000-	1	2.70000+	4-2.00000-	19999	3	2	893			
2.71000+	4	0.00000+	0	2.76000+	4	0.00000+	0	2.73000+	4-1.81000+	09999	3	2	894	
2.30000+	4-1.50000+	0	2.55000+	4-1.50000+	0	2.58000+	4-1.50000+	09999	3	2	895			
2.90000+	4-2.10000+	0	2.92000+	4-2.00000+	0	2.94000+	4-1.50000+	09999	3	2	896			
2.95000+	4	0.00000+	0	3.20000+	4	0.00000+	0	3.22000+	4-9.00000-	19999	3	2	897	
3.24000+	4-9.00000-	1	3.25000+	4	1.20000+	1	3.26000+	4-5.00000-	19999	3	2	898		
3.27000+	4	0.00000+	0	3.32000+	4	0.00000+	0	3.34000+	4-1.40000+	09999	3	2	899	

3.36000+	4	-1.20000+	0	3.35000+	4	-1.00000+	0	3.40000+	4	-1.10000+	0	99999	3	2	901
3.44000+	4	-1.10000+	0	3.45000+	4	-5.00000+	1	3.47500+	4	0.00000+	0	99999	3	2	901
3.49900+	4	0.00000+	0	3.50000+	4	0.00000+	0	3.50200+	4	0.00000+	0	99999	3	2	902
3.50400+	4	0.00000+	0	3.50500+	4	0.00000+	0	3.50800+	4	0.00000+	0	99999	3	2	903
3.51000+	4	0.00000+	0	3.51200+	4	0.00000+	0	3.51400+	4	0.00000+	0	99999	3	2	904
3.51600+	4	0.00000+	0	3.51800+	4	0.00000+	0	3.52000+	4	0.00000+	0	99999	3	2	905
3.52200+	4	0.00000+	0	3.52400+	4	0.00000+	0	3.52600+	4	0.00000+	0	99999	3	2	907
3.52800+	4	0.00000+	0	3.53000+	4	0.00000+	0	3.53200+	4	0.00000+	0	99999	3	2	908
3.53400+	4	0.00000+	0	3.53600+	4	-3.00000-	1	3.53800+	4	-6.00000-	1	99999	3	2	909
3.54000+	4	-7.00000-	1	3.56000+	4	-4.60000+	0	3.57000+	4	-5.20000+	0	99999	3	2	910
3.58000+	4	-5.70000+	0	3.59000+	4	-6.00000+	0	3.60000+	4	-5.40000+	0	99999	3	2	911
3.60000+	4	8.50000+	0	3.62000+	4	8.05000+	0	3.64000+	4	7.50000+	0	99999	3	2	912
3.66000+	4	7.20000+	0	3.67000+	4	7.20000+	0	3.68000+	4	1.03000+	0	99999	3	2	913
3.68800+	4	1.03000+	1	3.70000+	4	7.30000+	0	3.71000+	4	7.00000+	0	99999	3	2	914
3.72000+	4	6.70000+	0	3.74000+	4	6.40000+	0	3.76000+	4	6.00000+	0	99999	3	2	915
3.78000+	4	5.30000+	0	3.80000+	4	5.50000+	0	3.82000+	4	5.30000+	0	99999	3	2	916
3.84000+	4	5.10000+	0	3.86000+	4	5.00000+	0	3.88000+	4	4.95000+	0	99999	3	2	917
3.90000+	4	4.90000+	0	3.94000+	4	4.60000+	0	3.96000+	4	4.40000+	0	99999	3	2	918
3.98000+	4	4.00000+	0	3.99000+	4	3.80000+	0	4.00000+	4	3.40000+	0	99999	3	2	919
4.01000+	4	2.30000+	0	4.01500+	4	2.80000+	0	4.02000+	4	2.90000+	0	99999	3	2	920
4.03000+	4	7.50000+	0	4.04000+	4	6.70000+	0	4.05500+	4	4.30000+	0	99999	3	2	921
4.06000+	4	4.35000+	0	4.07000+	4	4.40000+	0	4.08000+	4	4.35000+	0	99999	3	2	922
4.10000+	4	3.80000+	0	4.12000+	4	3.15000+	0	4.13500+	4	2.50000+	0	99999	3	2	923
4.14000+	4	2.50000+	0	4.15750+	4	1.07500+	1	4.16000+	4	1.10000+	1	99999	3	2	924
4.16250+	4	1.07500+	1	4.17000+	4	7.80000+	0	4.18000+	4	4.90000+	0	99999	3	2	925
4.18500+	4	4.50000+	0	4.19000+	4	4.20000+	0	4.19500+	4	4.00000+	0	99999	3	2	926
4.20000+	4	3.35000+	0	4.22000+	4	3.37500+	0	4.24000+	4	3.17500+	0	99999	3	2	927
4.26000+	4	2.83000+	0	4.27000+	4	2.80000+	0	4.28000+	4	3.09000+	0	99999	3	2	928
4.29000+	4	3.51000+	0	4.29500+	4	3.50000+	0	4.30000+	4	3.10000+	0	99999	3	2	929
4.30500+	4	2.70000+	0	4.32000+	4	2.40000+	0	4.34000+	4	1.85000+	0	99999	3	2	930
4.35000+	4	1.60000+	0	4.37000+	4	2.82000+	0	4.37500+	4	2.80000+	0	99999	3	2	931
4.38000+	4	2.65000+	0	4.41000+	4	1.65000+	0	4.44000+	4	1.25000+	0	99999	3	2	932
4.48000+	4	1.00000+	0	4.49500+	4	2.35000+	0	4.50500+	4	3.30000+	0	99999	3	2	933
4.52000+	4	1.96000+	1	4.52600+	4	2.80000+	1	4.52800+	4	2.81000+	1	99999	3	2	934
4.56000+	4	8.70000+	0	4.57000+	4	8.40000+	1	4.59900+	4	2.79000+	1	99999	3	2	935
4.58100+	4	2.80000+	1	4.65000+	4	1.00000+	1	4.68000+	4	6.40000+	0	99999	3	2	936
4.70000+	4	5.10000+	0	4.71000+	4	4.60000+	0	4.72500+	4	8.60000+	0	99999	3	2	937
4.73000+	4	1.00000+	1	4.73500+	4	1.02000+	1	4.74000+	4	9.40000+	0	99999	3	2	938
4.76000+	4	6.70000+	0	4.78000+	4	5.10000+	0	4.80000+	4	4.50000+	0	99999	3	2	939
4.84000+	4	4.00000+	0	4.86000+	4	3.70000+	0	4.88000+	4	3.40000+	0	99999	3	2	940
4.90000+	4	3.10000+	0	4.92000+	4	2.65000+	0	4.94000+	4	2.35000+	0	99999	3	2	941
4.99500+	4	3.10000+	0	4.96000+	4	3.11000+	0	5.00000+	4	1.50000+	0	99999	3	2	942
5.01250+	4	1.37500+	0	5.02000+	4	1.37500+	0	5.05120+	4	1.07500+	0	99999	3	2	943
5.02650+	4	1.03000+	1	5.08750+	4	3.90000+	0	5.10000+	4	3.50000+	0	99999	3	2	944
5.01250+	4	4.00000+	0	5.12500+	4	6.00000+	0	5.15000+	4	2.45000+	0	99999	3	2	945
5.016120+	4	2.36000+	1	5.15250+	4	2.50000+	1	5.22500+	4	9.70000+	0	99999	3	2	946
5.02500+	4	6.50000+	0	5.27500+	4	3.70000+	0	5.29000+	4	2.47500+	0	99999	3	2	947
5.03100+	4	1.14000+	1	5.35000+	4	6.60000+	0	5.36250+	4	7.50000+	0	99999	3	2	948
5.037500+	4	9.40000+	0	5.40000+	4	2.20000+	1	5.40620+	4	2.26000+	1	99999	3	2	949
5.041250+	4	2.26000+	1	5.48750+	4	7.50000+	0	5.50000+	4	6.70000+	0	99999	3	2	950
5.052500+	4	6.10000+	0	5.55000+	4	5.30000+	0	5.57500+	4	4.50000+	0	99999	3	2	951
5.058750+	4	4.00000+	0	5.60000+	4	3.10000+	0	5.61250+	4	3.60000+	0	99999	3	2	952
5.052500+	4	4.10000+	0	5.65000+	4	1.40000+	1	5.65620+	4	1.60000+	1	99999	3	2	953
5.062500+	4	1.40000+	1	5.67500+	4	9.00000+	0	5.70000+	4	6.90000+	0	99999	3	2	954
5.075000+	4	5.30000+	0	5.77500+	4	4.60000+	0	5.79460+	4	5.10000+	0	99999	3	2	955
5.080000+	4	4.90000+	0	5.81250+	4	3.60000+	0	5.82500+	4	3.40000+	0	99999	3	2	956
5.085000+	4	2.65000+	0	5.87500+	4	2.10000+	0	5.91200+	4	1.30000+	0	99999	3	2	957
5.092500+	4	1.75000+	1	5.92500+	4	1.72000+	1	5.93800+	4	1.60000+	1	99999	3	2	958
5.096250+	4	5.30000+	0	5.97500+	4	7.70000+	0	5.97500+	4	7.40000+	0	99999	3	2	959
5.060000+	4	1.30000+	1	6.00000+	4	1.33100+	1	6.11250+	4	1.335000+	1	99999	3	2	960

5.02500+	4	9.00000+	0	5.03000+	4	8.30000+	0	6.05000+	4	7.10000+	0	99999	3	2	96
6.07500+	4	5.50000+	0	6.09000+	4	4.20000+	0	6.10000+	4	4.15000+	0	99999	3	2	96
6.11000+	4	4.16000+	0	5.11250+	4	4.50000+	0	6.12500+	4	3.00000+	0	99999	3	2	96
6.13000+	4	1.05000+	1	6.13500+	4	1.07000+	1	5.14000+	4	1.15000+	1	199999	3	2	96
6.15000+	4	8.20000+	0	6.17500+	4	6.10000+	0	6.20000+	4	5.40000+	0	99999	3	2	96
6.21250+	4	5.25000+	0	6.22500+	4	5.15000+	0	6.23750+	4	5.10000+	0	99999	3	2	96
6.25000+	4	4.70000+	0	6.25250+	4	4.60000+	0	6.27500+	4	3.40000+	0	99999	3	2	96
6.31000+	4	7.20000+	0	6.31250+	4	7.30000+	0	6.31500+	4	7.20000+	0	99999	3	2	95
6.36250+	4	4.20000+	0	6.33750+	4	4.60000+	0	6.39000+	4	4.50000+	0	99999	3	2	96
6.42500+	4	4.20000+	0	6.45000+	4	3.75000+	0	6.47500+	4	3.45000+	0	99999	3	2	96
6.50000+	4	3.30000+	0	6.52500+	4	3.20000+	0	6.55000+	4	3.10000+	0	99999	3	2	97
6.56250+	4	2.95000+	0	6.57500+	4	2.70000+	0	6.60000+	4	2.10000+	0	99999	3	2	97
6.63750+	4	7.00000+	0	6.64000+	4	7.50000+	0	6.64500+	4	7.40000+	0	99999	3	2	97
6.65000+	4	7.30000+	0	6.67000+	4	4.20000+	0	6.68750+	4	3.60000+	0	99999	3	2	97
6.70000+	4	3.35000+	0	6.72500+	4	3.00000+	0	6.75000+	4	2.90000+	0	99999	3	2	97
6.75680+	4	2.88000+	0	6.76250+	4	2.90000+	0	6.77500+	4	3.10000+	0	99999	3	2	97
6.78000+	4	3.25000+	0	6.78500+	4	3.00000+	0	6.79000+	4	3.25000+	0	99999	3	2	97
6.80000+	4	2.75000+	0	6.81250+	4	2.50000+	0	6.82500+	4	2.35000+	0	99999	3	2	97
6.83750+	4	2.25000+	0	6.85000+	4	2.22500+	0	6.86250+	4	2.30000+	0	99999	3	2	97
6.87500+	4	2.50000+	0	6.88000+	4	2.54000+	0	6.88500+	4	2.55000+	0	99999	3	2	98
6.89000+	4	2.54000+	0	6.90000+	4	2.25000+	0	6.92500+	4	1.65000+	0	99999	3	2	98
6.93750+	4	1.55000+	0	6.95000+	4	1.52000+	0	6.96250+	4	1.51000+	0	99999	3	2	98
6.97500+	4	1.62000+	0	6.98750+	4	1.90000+	0	7.02500+	4	1.03000+	0	199999	3	2	98
7.03000+	4	1.10000+	1	7.03500+	4	1.12000+	1	7.04000+	4	1.10000+	1	199999	3	2	98
7.05000+	4	9.50000+	0	7.07500+	4	5.70000+	0	7.10000+	4	4.30000+	0	99999	3	2	98
7.12500+	4	3.40000+	0	7.13750+	4	3.00000+	0	7.14000+	4	3.00000+	0	99999	3	2	98
7.15000+	4	3.10000+	0	7.21250+	4	1.10000+	1	7.22000+	4	1.11000+	1	199999	3	2	98
7.22500+	4	1.05000+	1	7.23750+	4	8.60000+	0	7.24000+	4	8.75000+	0	99999	3	2	98
7.25000+	4	8.80000+	0	7.27000+	4	1.13000+	1	7.27250+	4	1.14000+	1	199999	3	2	98
7.27500+	4	1.13000+	1	7.35300+	4	5.10000+	0	7.35800+	4	4.90000+	0	99999	3	2	99
7.36250+	4	4.80000+	0	7.37500+	4	4.65000+	0	7.38750+	4	4.50000+	0	99999	3	2	99
7.40000+	4	3.98000+	0	7.42500+	4	3.40000+	0	7.43750+	4	3.20000+	0	99999	3	2	99
7.45000+	4	3.12000+	0	7.46250+	4	3.10000+	0	7.49000+	4	4.10000+	0	99999	3	2	99
7.49500+	4	4.13000+	0	7.50000+	4	3.05000+	0	7.54500+	4	2.55000+	0	99999	3	2	99
7.55000+	4	2.54000+	0	7.56000+	4	2.55000+	0	7.58000+	4	2.90000+	0	99999	3	2	99
7.59000+	4	3.60000+	0	7.59500+	4	2.90000+	0	7.65000+	4	1.65000+	0	99999	3	2	99
7.67000+	4	1.30000+	0	7.67500+	4	1.40000+	0	7.72500+	4	1.00000+	0	199999	3	2	99
7.72550+	4	1.19000+	1	7.73000+	4	1.20000+	1	7.82500+	4	4.05000+	0	99999	3	2	99
7.85000+	4	3.30000+	0	7.87500+	4	2.75000+	0	7.90000+	4	2.36000+	0	99999	3	2	99
7.91250+	4	2.22000+	0	7.92500+	4	2.25000+	0	7.96250+	4	1.05000+	0	199999	3	2	100
7.97000+	4	1.05000+	1	7.97500+	4	1.04000+	1	8.00000+	4	5.30000+	0	99999	3	2	100
8.01250+	4	4.60000+	0	8.02500+	4	4.05000+	0	8.05000+	4	3.10000+	0	99999	3	2	100
8.06250+	4	2.65000+	0	8.07500+	4	2.14000+	0	8.08750+	4	1.63000+	0	99999	3	2	100
8.10000+	4	1.35000+	0	8.11250+	4	1.30000+	0	8.12500+	4	1.40000+	0	99999	3	2	100
8.15000+	4	3.30000+	0	8.18500+	4	9.50000+	0	8.19500+	4	9.70000+	0	99999	3	2	100
8.20000+	4	8.00000+	0	8.22500+	4	4.50000+	0	8.25000+	4	3.00000+	0	99999	3	2	100
8.27500+	4	2.15000+	0	8.28750+	4	1.85000+	0	8.30000+	4	1.79000+	0	99999	3	2	100
8.31000+	4	1.70000+	0	8.31250+	4	1.80000+	0	8.35000+	4	5.60000+	0	99999	3	2	100
8.35500+	4	6.20000+	0	8.36000+	4	6.30000+	0	8.37500+	4	5.70000+	0	99999	3	2	100
8.38750+	4	5.30000+	0	8.40000+	4	5.40000+	0	8.44500+	4	9.80000+	0	99999	3	2	101
8.45000+	4	1.00000+	1	8.45500+	4	9.80000+	0	8.47500+	4	6.70000+	0	99999	3	2	101
8.50000+	4	4.70000+	0	8.52500+	4	3.55000+	0	8.53750+	4	3.12000+	0	99999	3	2	101
8.55000+	4	2.70000+	0	8.57500+	4	1.90000+	0	8.58750+	4	1.50000+	0	99999	3	2	101
8.60000+	4	1.55000+	0	8.62000+	4	1.75000+	0	8.62500+	4	1.75000+	0	99999	3	2	101
8.63750+	4	1.65000+	0	8.65000+	4	1.55000+	0	8.67500+	4	1.54000+	0	99999	3	2	101
8.65500+	4	1.25000+	0	8.70000+	4	1.45000+	0	8.71250+	4	1.35000+	0	99999	3	2	101
8.72500+	4	1.12000+	0	8.73750+	4	1.07000+	0	8.75000+	4	1.13000+	0	99999	3	2	101
8.75000+	4	7.50000+	0	8.83500+	4	9.20000+	0	8.83750+	4	9.30000+	0	99999	3	2	101
8.85000+	4	1.19000+	1	8.86250+	4	1.30000+	1	8.87500+	4	1.46000+	0	199999	3	2	101
8.95000+	4	1.55000+	0	8.95000+	4	1.52000+	0	8.97000+	4	1.57000+	0	199999	3	2	101

8.91000	4	1.55000	1	8.91250	4	1.50000	1	8.92500	4	1.30000	19999	3	2	102	
9.07500	4	2.65000	0	9.05750	4	2.45000	0	9.09000	4	2.40000	09999	3	2	102	
9.10000	4	2.42000	0	9.12500	4	2.95000	0	9.13750	4	3.30000	09999	3	2	102	
9.15000	4	3.30000	0	9.16250	4	3.90000	0	9.17500	4	4.15000	09999	3	2	102	
9.18750	4	4.25000	0	9.21000	4	4.40000	0	9.21250	4	4.55000	09999	3	2	102	
9.22500	4	5.10000	0	9.25000	4	7.00000	0	9.27500	4	1.10000	19999	3	2	102	
9.30000	4	1.80000	1	9.31250	4	2.10000	1	9.32500	4	1.90000	19999	3	2	102	
9.37500	4	1.16000	1	9.38750	4	1.05000	1	9.40000	4	1.06000	19999	3	2	102	
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.60110E	05	.37320E	01	.60200E	06	.34520E	01	.60250E	06	.33020E	01	99999	3	2 136
.60360E	05	.39420E	01	.60400E	06	.39620E	01	.60610E	06	.29320E	01	99999	3	2 136
.60550E	05	.21920E	01	.60700E	06	.25720E	01	.60740E	06	.31020E	01	99999	3	2 137
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.55370E	05	.42320E	01	.55440E	06	.44220E	01	.55670E	06	.36520E	019999	3	2	1391
.55780E	06	.35920E	01	.65900E	06	.23020E	01	.65960E	06	.28420E	019999	3	2	1392
.56030E	06	.22920E	01	.66210E	06	.49020E	01	.56270E	05	.51520E	019999	3	2	1393
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.73390E	06	.41318E	01	.73510E	06	.31915E	01	.73570E	06	.30518E	019999	3	2	1413
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.77060E	06	.33110E	01	.77190E	06	.42616E	01	.77320E	06	.36916E	019999	3	2	1423
.77490E	06	.43316E	01	.77590E	06	.44016E	01	.77780E	06	.38116E	019999	3	2	1424
.77920E	05	.31016E	01	.78050E	06	.32216E	01	.78310E	06	.25916E	019999	3	2	1425
.78010E	05	.36410E	01	.78750E	06	.32616E	01	.78850E	06	.30916E	019999	3	2	1426
.79050E	05	.40615E	01	.79260E	06	.33415E	01	.79360E	06	.35315E	019999	3	-2	1427
.79490E	06	.27315E	01	.79500E	06	.25615E	01	.79600E	06	.28505E	019999	3	2	1428
.79700E	05	.26715E	01	.79600E	06	.28315E	01	.79940E	06	.34215E	019999	3	2	1429
.80000E	05	.34299E	01	.80250E	06	.34615E	01	.80460E	06	.29515E	019999	3	2	1430
.80670E	05	.34415E	01	.80740E	06	.34215E	01	.80840E	06	.3215E	019999	3	2	1431
.80980E	05	.32315E	01	.81090E	06	.32915E	01	.81410E	06	.28115E	019999	3	2	1432
.81510E	05	.21715E	01	.81760E	06	.37315E	01	.81830E	06	.30815E	019999	3	2	1433
.81970E	05	.37115E	01	.82190E	06	.23915E	01	.82260E	06	.28015E	019999	3	2	1434
.82300E	05	.22715E	01	.82400E	06	.36215E	01	.82580E	06	.30315E	019999	3	2	1435
.82730E	05	.38215E	01	.82840E	06	.24815E	01	.82910E	06	.29515E	019999	3	2	1436
.83050E	05	.34415E	01	.83130E	06	.35715E	01	.83420E	06	.32915E	019999	3	2	1437
.83720E	05	.38515E	01	.83440E	06	.39515E	01	.84200E	06	.33315E	019999	3	2	1438
.84420E	05	.32115E	01	.84590E	06	.32015E	01	.84680E	06	.34415E	019999	3	2	1439

• 54760E	05	.34515E	01	.84290E	06	.34815E	01	.55320E	06	.27915E	019999	3	2 14
• 55905E	05	.25515E	01	.85700E	06	.30915E	01	.55900E	06	.32515E	019999	3	2 14
• 55970E	06	.39515E	01	.86640E	06	.30415E	01	.56240E	06	.33415E	019999	3	2 14
• 56400E	05	.31150E	01	.86570E	06	.23615E	01	.87020E	06	.35715E	019999	3	2 14
• 57150E	05	.35715E	01	.87290E	06	.34215E	01	.87490E	06	.36515E	019999	3	2 14
• 57690E	05	.41115E	01	.87770E	06	.43915E	01	.87850E	06	.44215E	019999	3	2 14
• 58080E	05	.37215E	01	.88280E	06	.36415E	01	.88440E	06	.32315E	019999	3	2 14
• 58660E	05	.31115E	01	.89260E	06	.39415E	01	.89450E	06	.34415E	019999	3	2 14
• 59070E	05	.35715E	01	.89930E	06	.32715E	01	.90000E	06	.33535E	019999	3	2 14
• 59730E	06	.34115E	01	.90310E	06	.27315E	01	.90650E	06	.32715E	019999	3	2 14
• 61100E	05	.35115E	01	.90930E	06	.32215E	01	.90930E	06	.33215E	019999	3	2 14
• 61900E	05	.30015E	01	.92120E	06	.34715E	01	.92290E	06	.39815E	019999	3	2 14
• 62500E	06	.32215E	01	.92590E	06	.31015E	01	.92750E	06	.31715E	019999	3	2 14
• 62890E	05	.30115E	01	.93100E	06	.33215E	01	.93190E	06	.33115E	019999	3	2 14
• 63410E	06	.24515E	01	.93550E	06	.28515E	01	.93290E	06	.35315E	019999	3	2 14
• 64190E	05	.29015E	01	.94420E	06	.27915E	01	.94500E	06	.29215E	019999	3	2 14
• 64640E	05	.27215E	01	.94900E	06	.33215E	01	.95080E	06	.30915E	019999	3	2 14
• 65390E	06	.34515E	01	.95710E	06	.42115E	01	.95840E	06	.39315E	019999	3	2 14
• 66030E	06	.40415E	01	.96210E	06	.38515E	01	.96390E	06	.31915E	019999	3	2 14
• 66800E	06	.33315E	01	.96950E	06	.29915E	01	.97310E	06	.35915E	019999	3	2 14
• 67490E	06	.40915E	01	.97720E	06	.34315E	01	.98000E	06	.31315E	019999	3	2 14
• 68190E	05	.33915E	01	.98360E	06	.34415E	01	.95610E	06	.37015E	019999	3	2 14
• 698610E	05	.36115E	01	.99180E	06	.29115E	01	.99520E	06	.36316E	019999	3	2 14
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• 10090E	07	.33716E	01	.10100E	07	.35015E	01	.10080E	07	.32216E	019999	3	2 14
• 10180E	07	.35916E	01	.10200E	07	.32615E	01	.10140E	07	.26416E	019999	3	2 14
• 10260E	07	.35715E	01	.10290E	07	.32116E	01	.10330E	07	.32716E	019999	3	2 14
• 10350E	07	.26616E	01	.10400E	07	.33715E	01	.10430E	07	.32616E	019999	3	2 14
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• 10580E	07	.26716E	01	.10620E	07	.33616E	01	.10660E	07	.32716E	019999	3	2 14
• 10690E	07	.29815E	01	.10720E	07	.31915E	01	.10770E	07	.31816E	019999	3	2 14
• 10790E	07	.33916E	01	.10810E	07	.32316E	01	.10830E	07	.34016E	019999	3	2 14
• 10860E	07	.28116E	01	.10880E	07	.31310E	01	.10900E	07	.33716E	019999	3	2 14
• 10920E	07	.34616E	01	.10950E	07	.27716E	01	.11000E	07	.32017E	019999	3	2 14
• 11040E	07	.24617E	01	.11070E	07	.31117E	01	.11100E	07	.32017E	019999	3	2 14
• 11130E	07	.29517E	01	.11160E	07	.34517E	01	.11180E	07	.35417E	019999	3	2 14
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• 11270E	07	.35929E	01	.11310E	07	.37690E	01	.11350E	07	.32451E	019999	3	2 14
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.16230E	07	.26506E	01	.16260E	07	.28039E	01	.15320E	07	.25751E	019999	3	2	1523
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.16630E	07	.24955E	01	.16670E	07	.27230E	01	.16710E	07	.25605E	019999	3	2	1526
.15740E	07	.27286E	01	.16800E	07	.26649E	01	.16880E	07	.23498E	019999	3	2	1527
.17000E	07	.24422E	01	.17040E	07	.24397E	01	.17100E	07	.27659E	019999	3	2	1528
.17150E	07	.25527E	01	.17190E	07	.27502E	01	.17290E	07	.24239E	019999	3	2	1529
.17350E	07	.26101E	01	.17400E	07	.24370E	01	.17460E	07	.21132E	019999	3	2	1530
.17500E	07	.22506E	01	.17560E	07	.28156E	01	.17600E	07	.23043E	019999	3	2	1531
.17660E	07	.20405E	01	.17710E	07	.21073E	01	.17730E	07	.22551E	019999	3	2	1532
.17780E	07	.26194E	01	.17810E	07	.26654E	01	.17870E	07	.23373E	019999	3	2	1533
.17920E	07	.26406E	01	.17960E	07	.26053E	01	.18000E	07	.23499E	019999	3	2	1534
.18020E	07	.28283E	01	.18070E	07	.24141E	01	.18100E	07	.25316E	019999	3	2	1535
.18120E	07	.25299E	01	.18170E	07	.21355E	01	.18250E	07	.24191E	019999	3	2	1536
.18350E	07	.26208E	01	.18420E	07	.28450E	01	.18490E	07	.29492E	019999	3	2	1537
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.20400E	07	.21596E	01	.20550E	07	.22778E	01	.20650E	07	.25266E	019999	3	2	1547
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.22740E	07	.23271E	01	.23010E	07	.23519E	01	.23190E	07	.22318E	019999	3	2	1554
.23400E	07	.24900E	01	.23510E	07	.21262E	01	.23890E	07	.21525E	019999	3	2	1555
.24000E	07	.24272E	01	.24090E	07	.24725E	01	.24310E	07	.20734E	019999	3	2	1556
.24300E	07	.21773E	01	.24400E	07	.21505E	01	.24490E	07	.22270E	019999	3	2	1557
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.26160E	07	.21001E	01	.26230E	07	.22893E	01	.25340E	07	.21739E	0199999	3	2	1563
.25410E	07	.22570E	01	.26590E	07	.20514E	01	.26650E	07	.21751E	0199999	3	2	1564
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.11500E	08	.17857E	01	.11570E	08	.17754E	01	.12000E	08	.17061E	0199999	3	2	1599
.12100E	08	.16921E	01	.12500E	08	.16452E	01	.12630E	08	.16327E	0199999	3	2	1600
.13000E	08	.15396E	01	.13150E	08	.15697E	01	.13500E	08	.15318E	0199999	3	2	1601
.13690E	08	.15115E	01	.14000E	08	.14781E	01	.14220E	08	.14552E	0199999	3	2	1602
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.15290E	08	.13575E	01	.15500E	08	.13413E	01	.15820E	08	.13165E	0199999	3	2	1604
.16000E	08	.13054E	01	.16360E	08	.12835E	01	.16500E	08	.12746E	0199999	3	2	1605
.16900E	08	.12467E	01	.17000E	08	.12448E	01	.17440E	08	.12246E	0199999	3	2	1606
.17500E	08	.12225E	01	.17990E	08	.12065E	01	.18000E	08	.12065E	0199999	3	2	1607
.18540E	08	.11343E	01	.19000E	08	.11662E	01	.19100E	08	.11540E	0199999	3	2	1608
.19660E	08	.11590E	01	.20000E	08	.11651E	01			.9999	3	2	1609	
										.9999	3	0	1610	
2.70590+	4	5.34269+	1		0		99		0	09999	3	4	1611	
0.00000+	0-1.09990+	6		0		0		1	599999	3	4	1612		
	59	2							.9999	3	4	1613		
.11180E	07	.00000E	00	.12000E	07	.00000E-01	01	.12100E	07	.82000E-01	0199999	3	4	1614
.13030E	07	.22100E	00	.13130E	07	.22200E-01	01	.14000E	07	.32500E-01	0099999	3	4	1615
.14840E	07	.34030E	00	.15000E	07	.44700E-01	00	.16000E	07	.60000E-01	0099999	3	4	1616
.17700E	07	.71777E	00	.18000E	07	.75410E-01	00	.19000E	07	.83750E-01	0099999	3	4	1617
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.30000E	07	.13470E	01	.32000E	07	.13940E	01	.34000E	07	.14040E	01	99999	3	4	1622
.35000E	07	.14030E	01	.40000E	07	.14130E	01	.45000E	07	.14410E	01	99999	3	4	1623
.50000E	07	.14590E	01	.55000E	07	.14650E	01	.60000E	07	.14640E	01	99999	3	4	1624
.65000E	07	.14220E	01	.70000E	07	.13670E	01	.75000E	07	.13460E	01	99999	3	4	1625
.80000E	07	.13100E	01	.85000E	07	.12660E	01	.90000E	07	.12350E	01	99999	3	4	1626
.95000E	07	.11920E	01	.10000E	08	.11430E	01	.10500E	08	.11160E	01	99999	3	4	1627
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.12000E	08	.70400E	00	.13000E	08	.59400E	00	.13500E	08	.51400E	00	99999	3	4	1629
.14000E	05	.45500E	00	.14500E	08	.42400E	00	.15000E	08	.39300E	00	99999	3	4	1630
.15500E	08	.37400E	00	.16000E	08	.36400E	00	.16500E	08	.35400E	00	99999	3	4	1631
.17000E	05	.34400E	00	.17500E	08	.34000E	00	.18000E	08	.33500E	00	99999	3	4	1632
.19000E	05	.33500E	00	.20000E	08	.33500E	00					9999	3	4	1633
												9999	3	0	1634
2.70590+	4	5.84269+	1		0		99		0			09999	3	16	1635
0.00000+	0-1.04610+	7			0		0		1			149999	3	16	1636
	14		2									9999	3	16	1637
.10640E	08	,00000E	00	.11000E	08	.20000E	-01	.11500E	08	.15000E	00	99999	3	16	1638
.12000E	08	.23000E	00	.12590E	08	.40000E	00	.13000E	08	.50000E	00	99999	3	16	1639
.13500E	02	.53000E	00	.14000E	08	.64000E	00	.15000E	08	.71000E	00	99999	3	16	1640
.16000E	03	.75000E	00	.17000E	08	.76000E	00	.18000E	08	.80000E	00	99999	3	16	1641
.19000E	08	.81000E	00	.20000E	08	.80000E	00					9999	3	16	1642
												9999	3	0	1643
2.70590+	4	5.84269+	1		0		1		0			09999	3	51	1644
0.00000+	0-1.03990+	6			0		0		1			159999	3	51	1645
	15		2									9999	3	51	1646
.11180E	07	,00000E	00	.12000E	07	.80000E	-01	.13000E	07	.10000E	00	99999	3	51	1647
.15000E	07	.12000E	00	.16000E	07	.12300E	00	.18000E	07	.12700E	00	99999	3	51	1648
.20000E	07	.12200E	00	.22000E	07	.11900E	00	.25000E	07	.19000E	00	99999	3	51	1649
.30000E	07	.70000E	-01	.35000E	07	.50000E	-01	.40000E	07	.39000E	-01	99999	3	51	1650
.50000E	07	.20000E	-01	.60000E	07	.10000E	-01	.80000E	07	.00000E	00	99999	3	51	1651
												9999	3	0	1652
2.70590+	4	5.84269+	1		0		2		0			09999	3	52	1653
0.00000+	0-1.19000+	6			0		0		1			159999	3	52	1654
	15		2									9999	3	52	1655
.12100E	07	.00000E	00	.13000E	07	.12000E	00	.14000E	07	.16000E	00	99999	3	52	1656
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.20000E	07	.23500E	00	.22000E	07	.23000E	00	.25000E	07	.21200E	00	99999	3	52	1658
.30000E	07	.18500E	00	.35000E	07	.15000E	00	.40000E	07	.12000E	00	99999	3	52	1659
.50000E	07	.70000E	-01	.60000E	07	.30000E	-01	.50000E	07	.00300E	00	99999	3	52	1660
												9999	3	0	1661
2.70590+	4	5.84269+	1		0		3		0			09999	3	53	1662
0.00000+	0-1.29100+	6			0		0		1			149999	3	53	1663
	14		2									9999	3	53	1664
.13130E	07	.00000E	00	.14000E	07	.35000E	-01	.15000E	07	.42000E	-01	99999	3	53	1665
.15000E	07	.45000E	-01	.18000E	07	.58000E	-01	.20000E	07	.70000E	-01	99999	3	53	1666
.22000E	07	.73000E	-01	.25000E	07	.78000E	-01	.30000E	07	.75000E	-01	99999	3	53	1667
.32000E	07	.60000E	-01	.40000E	07	.50000E	-01	.50000E	07	.35000E	-01	99999	3	53	1668
.50000E	07	.20000E	-01	.80000E	07	.00000E	00					9999	3	0	1669
												9999	3	0	1670
2.70590+	4	5.84269+	1		0		4		0			09999	3	54	1671
0.00000+	0-1.45000+	6			0		0		1			139999	3	54	1671
	13		2									9999	3	54	1672
.14840E	07	.00000E	00	.15000E	07	.10000E	00	.16000E	07	.24000E	00	99999	3	54	1673
.16000E	07	.32400E	00	.20000E	07	.33300E	00	.22000E	07	.33700E	00	99999	3	54	1673
.22000E	07	.32600E	00	.30000E	07	.27000E	00	.35000E	07	.21600E	00	99999	3	54	1673
.40000E	07	.15000E	00	.50000E	07	.20000E	-01	.50000E	07	.39000E	-01	99999	3	54	1673
.50000E	07	.00000E	00									9999	3	54	1673
												9999	3	0	1674

2.70590+ 4	5.84269+ 1	.0	5	0	09999 3 55 1680
0.00000+ 0	-1.74400+ 6	0	0	1	119999 3 55 1681
11	2				9999 3 55 1682
.1730E 07	.00000E 00	.19000E 07	.90000E-01	.20000E 07	.11000E 009999 3 55 1683
.22000E 07	.13000E 00	.25000E 07	.15000E 00	.30000E 07	.13500E 009999 3 55 1684
.35000E 07	.11000E 00	.40000E 07	.95000E-01	.50000E 07	.43000E-019999 3 55 1685
.60000E 07	.23000E-01	.80000E 07	.00000E 00		9999 3 55 1686
					9999 3 0 1687
2.70590+ 4	5.84269+ 1	0	5	0	09999 3 56 1688
0.00000+ 0	-2.07000+ 6	0	0	1	109999 3 56 1689
10	2				9999 3 56 1690
.21050E 07	.00000E 00	.22000E 07	.60000E-01	.25000E 07	.12500E 009999 3 56 1691
.25000E 07	.14200E 00	.30000E 07	.14200E 00	.35000E 07	.11500E 009999 3 56 1692
.49000E 07	.90000E-01	.50000E 07	.53000E-01	.60000E 07	.22000E-019999 3 56 1693
.84000E 07	.00000E 00				9999 3 56 1694
					9999 3 0 1695
2.70590+ 4	5.84269+ 1	0	7	0	09999 3 57 1696
0.00000+ 0	-2.15000+ 6	0	0	1	119999 3 57 1697
11	2				9999 3 57 1698
.21960E 07	.00000E 00	.24000E 07	.90000E-01	.26000E 07	.15000E 009999 3 57 1699
.26000E 07	.18000E 00	.30000E 07	.19000E 00	.32000E 07	.19000E 009999 3 57 1700
.35000E 07	.17500E 00	.40000E 07	.15500E 00	.50000E 07	.90000E-019999 3 57 1701
.68000E 07	.40000E-01	.80000E 07	.00000E 00		9999 3 57 1702
					9999 3 0 1703
2.70590+ 4	5.84269+ 1	0	8	0	09999 3 58 1704
0.00000+ 0	-2.35000+ 6	0	0	1	129999 3 58 1705
12	2				9999 3 58 1706
.23890E 07	.00000E 00	.25000E 07	.50000E-01	.27000E 07	.85000E-019999 3 58 1707
.25000E 07	.95000E-01	.30000E 07	.11000E 00	.32000E 07	.11000E 009999 3 58 1708
.34000E 07	.10300E 00	.35000E 07	.10500E 00	.43000E 07	.82000E-019999 3 58 1709
.56000E 07	.50000E-01	.60000E 07	.30000E-01	.80000E 07	.00000E 009999 3 58 1710
					9999 3 0 1711
2.70590+ 4	5.84269+ 1	0	9	0	09999 3 59 1712
0.00000+ 0	-2.50000+ 6	0	0	1	109999 3 59 1713
10	2				9999 3 59 1714
.25420E 07	.00000E 00	.27000E 07	.11500E 00	.30000E 07	.17000E 009999 3 59 1715
.32000E 07	.13000E 00	.34000E 07	.18000E 00	.35000E 07	.17500E 009999 3 59 1716
.43000E 07	.16000E 00	.50000E 07	.10500E 00	.60000E 07	.60000E-019999 3 59 1717
.66000E 07	.00000E 00				9999 3 59 1718
					9999 3 0 1719
2.70590+ 4	5.84269+ 1	0	99	0	09999 3 91 1720
0.00000+ 0	0.00000+ 0	0	0	1	389999 3 91 1721
35	2				9999 3 91 1722
.24400E 07	.00000E 00	.25000E 07	.50000E-02	.26000E 07	.20000E-019999 3 91 1723
.30000E 07	.40000E-01	.32000E 07	.11000E 00	.34000E 07	.28500E 009999 3 91 1724
.35000E 07	.25000E 00	.40000E 07	.46700E 00	.45000E 07	.69000E 009999 3 91 1725
.50000E 07	.93300E 00	.55000E 07	.10500E 01	.60000E 07	.11500E 019999 3 91 1726
.55000E 07	.12170E 01	.70000E 07	.12500E 01	.75000E 07	.12780E 019999 3 91 1727
.30000E 07	.13000E 01	.85000E 07	.12660E 01	.90000E 07	.12350E 019999 3 91 1728
.95000E 07	.11920E 01	.10000E 08	.11430E 01	.10500E 03	.11160E 019999 3 91 1729
.11000E 05	.10930E 01	.11500E 08	.95000E 08	.12000E 08	.82600E 009999 3 91 1730
.12500E 05	.70400E 00	.13000E 08	.59400E 07	.13500E 08	.51400E 009999 3 91 1731
.14000E 03	.45500E 00	.14500E 08	.42400E 08	.15000E 08	.34300E 009999 3 91 1732
.15500E 03	.37300E 00	.16000E 08	.36400E 08	.16500E 08	.35400E 009999 3 91 1733
.17000E 03	.34400E 00	.17500E 08	.34000E 08	.18000E 08	.33500E 009999 3 91 1734
.19000E 03	.33500E 00	.20000E 08	.33500E 08		9999 3 91 1735
					9999 3 0 1736
2.70593+ 4	5.84269+ 1	0	99	0	09999 3 102 1737
0.00000+ 0	7.49000+ 6	0	0	3	4419999 3 102 1738
7	2	441	2		9999 3 102 1739

1.00000	5	3.04736	+ 0	1.00000	- 3	3.04736	- 1	1.00000	- 2	2.54500	- 19999	3102	1740
2.53000	- 2	1.60000	- 1	1.00000	- 1	3.04736	- 2	1.00000	+ 1	3.04736	- 39999	3102	1741
1.10000	+ 2	2.54500	- 3	3.00000	+ 2	1.46930	- 3	3.50000	+ 2	0.00000	+ 09999	3102	1742
3.44000	+ 4	0.00000	+ 0	3.45000	+ 4	0.00000	+ 0	3.47500	+ 4	0.00000	+ 09999	3102	1743
3.49900	+ 4	2.00000	- 5	3.50000	+ 4	5.00000	- 3	3.50200	+ 4	1.22000	- 29999	3102	1744
3.50400	+ 6	1.63000	- 2	3.50600	+ 4	2.12000	- 2	3.50800	+ 4	2.44000	- 29999	3102	1745
3.51000	+ 4	2.71000	- 2	3.51200	+ 4	2.95000	- 2	3.51400	+ 4	3.13000	- 29999	3102	1746
3.51600	+ 4	3.29000	- 2	3.51800	+ 4	3.42000	- 2	3.52000	+ 4	3.55000	- 29999	3102	1747
3.52200	+ 4	3.67000	- 2	3.52400	+ 4	3.78000	- 2	3.52600	+ 4	3.87000	- 29999	3102	1748
3.52800	+ 4	3.95000	- 2	3.53000	+ 4	4.02000	- 2	3.53200	+ 4	4.07000	- 29999	3102	1749
3.53400	+ 4	4.10000	- 2	3.53600	+ 4	4.13000	- 2	3.53800	+ 4	4.17000	- 29999	3102	1750
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3.60000	+ 4	4.53000	- 2	3.62000	+ 4	4.52000	- 2	3.64000	+ 4	4.50000	- 29999	3102	1753
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3.68800	+ 4	4.46000	- 2	3.70000	+ 4	4.45000	- 2	3.71000	+ 4	4.44000	- 29999	3102	1755
3.72000	+ 4	4.43000	- 2	3.74000	+ 4	4.40000	- 2	3.76000	+ 4	4.38000	- 29999	3102	1756
3.78000	+ 4	4.37000	- 2	3.80000	+ 4	4.36000	- 2	3.82000	+ 4	4.35000	- 29999	3102	1757
3.84000	+ 4	4.33000	- 2	3.86000	+ 4	4.30000	- 2	3.88000	+ 4	4.29000	- 29999	3102	1758
3.90000	+ 4	4.26000	- 2	3.94000	+ 4	4.26000	- 2	3.96000	+ 4	4.24000	- 29999	3102	1759
3.98000	+ 4	4.23000	- 2	3.99000	+ 4	4.22000	- 2	4.00000	+ 4	4.20000	- 29999	3102	1760
4.01000	+ 4	4.19250	- 2	4.01500	+ 4	4.18880	- 2	4.02000	+ 4	4.18500	- 29999	3102	1761
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4.06000	+ 4	4.15000	- 2	4.07000	+ 4	4.15500	- 2	4.08000	+ 4	4.14000	- 29999	3102	1763
4.10000	+ 4	4.12500	- 2	4.12000	+ 4	4.11000	- 2	4.13500	+ 4	4.09890	- 29999	3102	1764
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4.16250	+ 4	4.07500	- 2	4.17000	+ 4	4.07300	- 2	4.18000	+ 4	4.06500	- 29999	3102	1766
4.18500	+ 4	4.05100	- 2	4.19000	+ 4	4.05800	- 2	4.19500	+ 4	4.05400	- 29999	3102	1767
4.20000	+ 4	4.05000	- 2	4.22000	+ 4	4.03000	- 2	4.24000	+ 4	4.02000	- 29999	3102	1768
4.26000	+ 4	4.00500	- 2	4.27000	+ 4	4.06000	- 2	4.28000	+ 4	3.99800	- 29999	3102	1769
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4.38000	+ 4	3.95500	- 2	4.41000	+ 4	3.94000	- 2	4.44000	+ 4	3.91000	- 29999	3102	1773
4.48000	+ 4	3.97500	- 2	4.49500	+ 4	3.89000	- 2	4.50500	+ 4	3.88500	- 29999	3102	1774
4.52000	+ 4	3.85000	- 2	4.52600	+ 4	3.87000	- 2	4.52800	+ 4	3.84000	- 29999	3102	1775
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4.70000	+ 4	3.77000	- 2	4.71000	+ 4	3.76000	- 2	4.72500	+ 4	3.74000	- 29999	3102	1778
4.73000	+ 4	3.73670	- 2	4.73500	+ 4	3.73330	- 2	4.74000	+ 4	3.73000	- 29999	3102	1779
4.76000	+ 4	3.71000	- 2	4.78000	+ 4	3.70500	- 2	4.80000	+ 4	3.70000	- 29999	3102	1780
4.84000	+ 4	3.68000	- 2	4.86000	+ 4	3.67000	- 2	4.88000	+ 4	3.64000	- 29999	3102	1781
4.90000	+ 4	3.63000	- 2	4.92000	+ 4	3.62000	- 2	4.94000	+ 4	3.60750	- 29999	3102	1782
4.95500	+ 4	3.60000	- 2	4.96500	+ 4	3.59750	- 2	5.00000	+ 4	3.59000	- 29999	3102	1783
5.01250	+ 4	3.53370	- 2	5.02900	+ 4	3.57750	- 2	5.05120	+ 4	3.55440	- 29999	3102	1784
5.05500	+ 4	3.55160	- 2	5.04750	+ 4	3.54620	- 2	5.10000	+ 4	3.54000	- 29999	3102	1785
5.11250	+ 4	3.53000	- 2	5.12500	+ 4	3.51000	- 2	5.15000	+ 4	3.50000	- 29999	3102	1786
5.16120	+ 4	3.49750	- 2	5.16250	+ 4	3.49500	- 2	5.22500	+ 4	3.47000	- 29999	3102	1787
5.25000	+ 4	3.45000	- 2	5.27500	+ 4	3.44000	- 2	5.29000	+ 4	3.43500	- 29999	3102	1788
5.31000	+ 4	3.42000	- 2	5.35000	+ 4	3.41000	- 2	5.36250	+ 4	3.40500	- 29999	3102	1789
5.37500	+ 4	3.40250	- 2	5.40000	+ 4	3.40000	- 2	5.40620	+ 4	3.39850	- 29999	3102	1790
5.41250	+ 4	3.39700	- 2	5.43750	+ 4	3.38000	- 2	5.50000	+ 4	3.37000	- 29999	3102	1791
5.52500	+ 4	3.35000	- 2	5.55000	+ 4	3.33000	- 2	5.57500	+ 4	3.32000	- 29999	3102	1792
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5.56250	+ 4	3.29250	- 2	5.67500	+ 4	3.29000	- 2	5.70000	+ 4	3.28500	- 29999	3102	1793
5.72000	+ 4	3.26500	- 2	5.77500	+ 4	3.24000	- 2	5.79400	+ 4	3.23500	- 29999	3102	1794
5.80000	+ 4	3.25000	- 2	5.81250	+ 4	3.22430	- 2	5.82500	+ 4	3.21920	- 29999	3102	1794
5.85000	+ 4	3.20400	- 2	5.85750	+ 4	3.19750	- 2	5.87200	+ 4	3.18150	- 29999	3102	1794
5.92000	+ 4	3.17300	- 2	5.92500	+ 4	3.17300	- 2	5.93000	+ 4	3.17380	- 29999	3102	1794

5.96250+	4	3.15950-	2	5.97000+	4	3.15040-	2	5.97500+	4	3.15420-	29999	3102	1800
6.00000+	4	3.12000-	2	6.00620+	4	3.14500-	2	6.01250+	4	3.14600-	29999	3102	1801
6.02500+	4	3.14000-	2	6.03000+	4	3.13500-	2	6.05000+	4	3.13000-	29999	3102	1802
6.07500+	4	3.12000-	2	6.09500+	4	3.11500-	2	6.10000+	4	3.11000-	29999	3102	1803
6.11000+	4	3.10500-	2	6.11250+	4	3.10500-	2	6.12500+	4	3.10000-	29999	3102	1804
6.13000+	4	3.09800-	2	6.13500+	4	3.09500-	2	6.14000+	4	3.09400-	29999	3102	1805
6.15000+	4	3.09000-	2	6.17500+	4	3.08500-	2	6.20000+	4	3.08000-	29999	3102	1806
6.21250+	4	3.07250-	2	6.22500+	4	3.06500-	2	6.23750+	4	3.05750-	29999	3102	1807
6.25000+	4	3.05000-	2	6.26250+	4	3.04000-	2	6.27500+	4	3.03000-	29999	3102	1808
6.31000+	4	3.02000-	2	6.31250+	4	3.02500-	2	6.31500+	4	3.02400-	29999	3102	1809
6.36250+	4	3.01250-	2	6.35750+	4	3.00430-	2	6.39000+	4	3.00350-	29999	3102	1810
6.42500+	4	2.99150-	2	6.45000+	4	2.98350-	2	6.47500+	4	2.97500-	29999	3102	1811
6.50000+	4	2.95690-	2	6.52500+	4	2.95850-	2	6.55000+	4	2.95000-	29999	3102	1812
6.56250+	4	2.94000-	2	6.57500+	4	2.94200-	2	6.60000+	4	2.93350-	29999	3102	1813
6.63750+	4	2.92100-	2	6.64000+	4	2.92000-	2	6.64500+	4	2.91850-	29999	3102	1814
6.65000+	4	2.91700-	2	6.67000+	4	2.91000-	2	6.68750+	4	2.90400-	29999	3102	1815
6.70000+	4	2.90000-	2	6.72500+	4	2.89200-	2	6.75000+	4	2.88350-	29999	3102	1816
6.75000+	4	2.88150-	2	6.76250+	4	2.87960-	2	6.77500+	4	2.87550-	29999	3102	1817
6.76000+	4	2.87400-	2	6.78500+	4	2.87200-	2	6.79000+	4	2.87020-	29999	3102	1818
6.80000+	4	2.86700-	2	6.81250+	4	2.86230-	2	6.82500+	4	2.85860-	29999	3102	1819
6.83750+	4	2.85440-	2	6.85000+	4	2.85020-	2	6.86250+	4	2.84600-	29999	3102	1820
6.87500+	4	2.84160-	2	6.88000+	4	2.84020-	2	6.88500+	4	2.83860-	29999	3102	1821
6.89000+	4	2.83680-	2	6.90000+	4	2.83350-	2	6.92500+	4	2.82510-	29999	3102	1822
6.93750+	4	2.82023-	2	6.95000+	4	2.81560-	2	6.96250+	4	2.81260-	29999	3102	1823
6.97500+	4	2.80840-	2	6.97500+	4	2.80420-	2	7.02500+	4	2.79440-	29999	3102	1824
7.03000+	4	2.79333-	2	7.03500+	4	2.79220-	2	7.04000+	4	2.79110-	29999	3102	1825
7.05000+	4	2.78390-	2	7.07500+	4	2.78340-	2	7.10000+	4	2.77780-	29999	3102	1826
7.12500+	4	2.77220-	2	7.13750+	4	2.76940-	2	7.14000+	4	2.76890-	29999	3102	1827
7.15000+	4	2.76670-	2	7.21250+	4	2.75280-	2	7.22000+	4	2.75110-	29999	3102	1828
7.22500+	4	2.75000-	2	7.23750+	4	2.74730-	2	7.24000+	4	2.74670-	29999	3102	1829
7.25000+	4	2.74450-	2	7.27000+	4	2.74000-	2	7.27250+	4	2.73950-	29999	3102	1830
7.27500+	4	2.73900-	2	7.35300+	4	2.72160-	2	7.35800+	4	2.72050-	29999	3102	1831
7.36250+	4	2.71950-	2	7.37500+	4	2.71570-	2	7.38750+	4	2.71400-	29999	3102	1832
7.40000+	4	2.71110-	2	7.42500+	4	2.70750-	2	7.43750+	4	2.70290-	29999	3102	1833
7.445000+	4	2.70000-	2	7.46250+	4	2.69750-	2	7.49000+	4	2.69200-	29999	3102	1834
7.49500+	4	2.69100-	2	7.50000+	4	2.69000-	2	7.54500+	4	2.68100-	29999	3102	1835
7.55000+	4	2.68000-	2	7.56000+	4	2.67800-	2	7.58000+	4	2.67400-	29999	3102	1836
7.59000+	4	2.67200-	2	7.59500+	4	2.67130-	2	7.65000+	4	2.66000-	29999	3102	1837
7.61000+	4	2.66560-	2	7.67500+	4	2.65500-	2	7.72500+	4	2.64580-	29999	3102	1838
7.72550+	4	2.64570-	2	7.73000+	4	2.64500-	2	7.82500+	4	2.62920-	29999	3102	1839
7.55000+	4	2.62500-	2	7.87500+	4	2.62160-	2	7.90000+	4	2.61000-	29999	3102	1840
7.91250+	4	2.60870-	2	7.92500+	4	2.60750-	2	7.96250+	4	2.60370-	29999	3102	1841
7.97000+	4	2.60300-	2	7.97500+	4	2.60220-	2	8.00000+	4	2.59000-	29999	3102	1842
8.01250+	4	2.59720-	2	8.02500+	4	2.59450-	2	8.05000+	4	2.59900-	29999	3102	1843
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8.10000+	4	2.57600-	2	8.11250+	4	2.57520-	2	8.12500+	4	2.57250-	29999	3102	1845
8.15000+	4	2.55700-	2	8.18500+	4	2.55930-	2	8.19500+	4	2.55710-	29999	3102	1846
8.20000+	4	2.55700-	2	8.22500+	4	2.55050-	2	8.25000+	4	2.54500-	29999	3102	1847
8.27500+	4	2.53950-	2	8.26750+	4	2.53670-	2	8.30000+	4	2.53400-	29999	3102	1848
8.31000+	4	2.53319-	2	8.31250+	4	2.53110-	2	8.35000+	4	2.52300-	29999	3102	1849
8.35500+	4	2.52190-	2	8.36000+	4	2.52050-	2	8.37500+	4	2.51750-	29999	3102	1850
8.38750+	4	2.51470-	2	8.40000+	4	2.51200-	2	8.44500+	4	2.50200-	29999	3102	1851
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8.50000+	4	2.49000-	2	8.52500+	4	2.46550-	2	8.53750+	4	2.44330-	29999	3102	1853
8.55000+	4	2.43100-	2	8.57500+	4	2.47650-	2	8.58750+	4	2.47430-	29999	3102	1854
8.60000+	4	2.47250-	2	8.62000+	4	2.45540-	2	8.62500+	4	2.46750-	29999	3102	1855
8.63750+	4	2.44920-	2	8.65000+	4	2.46300-	2	8.67500+	4	2.45850-	29999	3102	1856
8.67500+	4	2.43520-	2	8.70000+	4	2.43400-	2	8.71250+	4	2.43170-	29999	3102	1857
8.72500+	4	2.44750-	2	8.73750+	4	2.44700-	2	8.75000+	4	2.44500-	29999	3102	1858
8.82500+	4	2.43150-	2	8.53500+	4	2.42970-	2	8.53750+	4	2.42940-	29999	3102	1859

0.35000+	4	2.42700-	2	6.86250+	4	2.42470-	2	8.87500+	4	2.42250-	29999	3102	1860
8.85750+	4	2.42330-	2	8.89500+	4	2.41910-	2	8.90000+	4	2.41800-	29999	3102	1861
8.71900+	4	2.41620-	2	8.91250+	4	2.41570-	2	8.92500+	4	2.41350-	29999	3102	1862
9.37500+	-	2.37000-	2	9.05750+	4	2.35790-	2	9.09000+	4	2.35740-	29999	3102	1863
9.10000+	-	2.35550-	2	9.12500+	4	2.38150-	2	9.13750+	4	2.37930-	29999	3102	1864
9.15000+	-	2.37720-	2	9.16250+	4	2.37500-	2	9.17500+	4	2.37290-	29999	3102	1865
9.18750+	-	2.37150-	2	9.21000+	4	2.36690-	2	9.21250+	4	2.36640-	29999	3102	1866
9.22500+	-	2.35540-	2	9.25000+	4	2.35030-	2	9.27500+	4	2.35580-	29999	3102	1867
9.30000+	-	2.35150-	2	9.31250+	4	2.34890-	2	9.32500+	4	2.34630-	29999	3102	1868
9.37500+	-	2.35510-	2	9.38750+	4	2.33350-	2	9.40000+	4	2.33090-	29999	3102	1869
9.41250+	-	2.35250-	2	9.42500+	4	2.32570-	2	9.43000+	4	2.32470-	29999	3102	1870
9.43750+	-	2.35230-	2	9.45000+	4	2.32050-	2	9.46250+	4	2.31810-	29999	3102	1871
9.47500+	-	2.35150-	2	9.43750+	4	2.31290-	2	9.50000+	4	2.31030-	29999	3102	1872
9.52500+	-	2.35510-	2	9.53000+	4	2.30410-	2	9.53750+	4	2.30260-	29999	3102	1873
9.54000+	-	2.30290-	2	9.55000+	4	2.30600-	2	9.55000+	4	2.28390-	29999	3102	1874
9.56250+	-	2.26750-	2	9.57500+	4	2.26510-	2	9.66750+	4	2.26470-	29999	3102	1875
9.70000+	-	2.25330-	2	9.71000+	4	2.25220-	2	9.71250+	4	2.26200-	29999	3102	1876
9.72500+	-	2.25060-	2	9.81250+	4	2.27030-	2	9.82500+	4	2.26950-	29999	3102	1877
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2.70590+ 4	5.34269+ 1	0	0	0	0	9999	3251 1934
0.00000+ 0	0.00000+ 0	0	0	1	589999	3251 1935	
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0.00000+ 0	0.00000+ 0	0	0	1	589999	3252 1959	
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							9999	3253	1984				
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						9999	3	0	2005				
						9999	0	0	2006				
2.70590+	4	5.64269+ 1	1	1	0	0	09999	4	2	2007			
0.00000+	0	5.54269+ 1	0	2	361	189999	4	2	2008				
1.00000+	0	1.14103- 2	5.85844- 5	-2.61371-10	0.00000+	0	0.00000+	99999	4	2	2009		
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0.00000+	0	0.00000+	0	9.99524- 1	2.05368- 2	2.00844- 4	9.54460- 79999	4	2	2012			
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0.00000+	0	0.00000+	0	0.00000+	0	0.00000+	0	0.00000+	99999	4	2	2014	
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8.9404-	4	3.42915- 9	0.00000+	0	0.00000+	0	0.00000+	09999	4	2	2023		
0.00000+	0	0.00000+	0	0.00000+	0	0.00000+	0	0.00000+	99999	4	2	2024	
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1.51311-	3	2.66690- 5	1.85131- 7	-2.26769- 9	0.00000+	0	0.00000+	99999	4	2	2026		
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5.96689-	7	-4.11017- 5	2.01555- 3	-6.37265- 2	9.94715- 1	8.36537- 29999	4	2	2035				
3.26497-	3	2.64292- 5	1.52015- 6	1.42575- 8	0.00000+	0	0.00000+	99999	4	2	2036		
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5.55652- 3	1.09502- 4	5.13186- 6	9.74631- 8	6.22554- 9	0.00000+ 09999	4	2	2046	
0.00000+ 0	-1.92569-20	2.31222-18	7.24663-16	1.12324-13	-1.16837-119999	4	2	2047	
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9.~8589- 1	1.14712- 1	6.61374- 3	2.51930- 4	7.05264- 6	1.26945- 79999	4	2	2049	
1.28600- 7	0.00000+ 0	0.00000+ 0	0-3.11018-20	9.35834-18	-2.05693-159999	4	2	2050	
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0.00000	+ 0 2.18500	+ 6 0 0 0	0 0 0	1 1 1	09999 4 56 2268
2	2				09999 4 56 2269
-1.00000	+ 0 5.00000	- 1 1.00000	+ 0 5.00000	- 1	29999 4 56 2270
0.00000	+ 0 8.00000	+ 6 0 0 0	0 0 0	1 1 1	9999 4 56 2271
2	2				29999 4 56 2272
-1.00000	+ 0 5.00000	- 1 1.00000	+ 0 5.00000	- 1	9999 4 56 2273
2.70590	+ 4 5.84269	+ 1 0 2 0	0 2 0	0 0 0	29999 4 56 2274
0.00000	+ 0 5.84269	+ 1 0 2 0	0 2 0	0 0 0	9999 4 56 2275
0.00000	+ 0 0.00000	+ 0 0 0 0	0 0 0	1 1 1	9999 4 56 2276
2	2				9999 4 0 2277
-1.00000	+ 0 5.00000	- 1 1.00000	+ 0 5.00000	- 1	09999 4 57 2278
2.70590	+ 4 5.84269	+ 1 0 2 0	0 2 0	0 0 0	09999 4 57 2279
0.00000	+ 0 5.84269	+ 1 0 2 0	0 2 0	0 0 0	

0.00000+	0	0.00000+	0	0	0	1	29999	4	57	2280					
	2		2				9999	4	57	2281					
0.00000+	0	2.19600+	6	0	0	1	29999	4	57	2282					
	2		2				9999	4	57	2283					
-1.00000+	0	5.30000-	1	1.00000+	0	5.00000- 1	9999	4	57	2284					
0.00000+	0	6.00000+	6	0	0	1	29999	4	57	2285					
	2		2				9999	4	57	2286					
-1.00000+	0	5.00000-	1	1.00000+	0	5.00000- 1	9999	4	57	2287					
	2		2				9999	4	0	2288					
2.70590+	4	5.84269+	1	0	2	0	09999	4	58	2289					
0.00000+	0	5.84269+	1	0	2	0	09999	4	58	2290					
0.00000+	0	0.00000+	0	0	0	1	29999	4	58	2291					
	2		2				9999	4	58	2292					
0.00000+	0	2.38900+	6	0	0	1	29999	4	58	2293					
	2		2				9999	4	58	2294					
-1.00000+	0	5.00000-	1	1.00000+	0	5.00000- 1	9999	4	58	2295					
0.00000+	0	8.00000+	6	0	0	1	29999	4	58	2296					
	2		2				9999	4	58	2297					
-1.00000+	0	5.00000-	1	1.00000+	0	5.00000- 1	9999	4	58	2298					
	2		2				9999	4	0	2299					
2.70590+	4	5.84269+	1	0	2	0	09999	4	59	2300					
0.00000+	0	5.84269+	1	0	2	0	09999	4	59	2301					
0.00000+	0	0.00000+	0	0	0	1	29999	4	59	2302					
	2		2				9999	4	59	2303					
0.00000+	0	2.54200+	6	0	0	1	29999	4	59	2304					
	2		2				9999	4	59	2305					
-1.00000+	0	5.00000-	1	1.00000+	0	5.00000- 1	9999	4	59	2306					
0.00000+	0	8.00000+	6	0	0	1	29999	4	59	2307					
	2		2				9999	4	59	2308					
-1.00000+	0	5.00000-	1	1.00000+	0	5.00000- 1	9999	4	59	2309					
	2		2				9999	4	0	2310					
2.70590+	4	5.84269+	1	0	2	0	09999	4	91	2311					
0.00000+	0	5.84269+	1	0	2	0	09999	4	91	2312					
0.00000+	0	0.00000+	0	0	0	1	29999	4	91	2313					
	2		2				9999	4	91	2314					
0.00000+	0	2.44000+	6	0	0	1	29999	4	91	2315					
	2		2				9999	4	91	2316					
-1.00000+	0	5.00000-	1	1.00000+	0	5.00000- 1	9999	4	91	2317					
0.00000+	0	2.00000+	7	0	0	1	29999	4	91	2318					
	2		2				9999	4	91	2319					
-1.00000+	0	5.00000-	1	1.00000+	0	5.00000- 1	9999	4	91	2320					
	2		2				9999	4	0	2321					
	2		2				9999	0	0	2322					
2.7059+	4	5.84269+	1	0	0	1	09999	5	16	2323					
1.0637+	7	0.0	+ 0	0	9	1	29999	5	16	2324					
	2		2				9999	5	16	2325					
1.0637+	7	1.0	+ 0	2.0	+ 7	1.0	+ 0	9999	5	16	2326				
0.0	+ 0	0.0	+ 0	0	0	1	39999	5	16	2327					
	3		5				9999	5	16	2328					
1.0637+	7	6.0	+ 5	1.50000+	7	1.40000+	6	2.00000+	7	1.74000+	6	9999	5	16	2329
	1.		5				9999	5	0	2330					
2.7059+	4	5.84269+	1	0	0	1	09999	5	91	2331					
2.44000+	4	0.00000+	0	0	9	1	29999	5	91	2332					
	2		2				9999	5	91	2333					
2.44000+	4	1.00000+	0	2.00000+	7	1.00000+	0	9999	5	91	2334				
0.00000+	0	0.00000+	0	0	0	1	14999	5	91	2335					
	1.		5				9999	5	91	2336					
2.44000+	4	5.00000+	5	2.50000+	6	5.10000+	5	3.00000+	6	6.80000+	5	9999	5	91	2337
4.00000+	7	7.00000+	5	3.00000+	6	5.70000+	5	6.00000+	6	9.50000+	5	9999	5	91	2337
7.00000+	6	1.00000+	6	3.00000+	6	1.20000+	6	9.00000+	6	1.32000+	6	6999	5	91	2337

1.00000+ 7	1.43000+ 6	1.20000+ 7	1.74000+ 6	1.40000+ 7	1.98000+ 6	9999 5 91	2340
1.60000+ 7	2.20000+ 6	2.00000+ 7	2.60000+ 6			9999 5 91	2341
						9999 5 0	2342
						9999 0 0	2343